THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
CENTERS FOR DISEASE CONTROL AND PREVENTION
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

convenes the

WORKING GROUP MEETING

ADVISORY BOARD ON

RADIATION AND WORKER HEALTH

DAY ONE

ABRWH WORKING GROUP MEETING

The verbatim transcript of the Working Group Meeting of the Advisory Board on Radiation and Worker Health held at the Logan Airport Marriott, Boston, Massachusetts, on February 27, 2006.

C O N T E N T S

February 27, 2006

TRANSCRIPT LEGEND

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-- (sic) denotes an incorrect usage or pronunciation of a word which is transcribed in its original form as reported.

-- (phonetically) indicates a phonetic spelling of the word if no confirmation of the correct spelling is available.

-- "uh-huh" represents an affirmative response, and "uh-uh" represents a negative response.

-- "*" denotes a spelling based on phonetics, without reference available.

-- (inaudible)/ (unintelligible) signifies speaker failure, usually failure to use a microphone.

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P R O C E E D I N G S

(1:45 p.m.)

WELCOME AND OPENING COMMENTS
DR. LEWIS WADE

MR. GRIFFON: Lew, we're ready to begin if you wanted to say a few words first.

DR. WADE (by telephone): Yes, thank you. We're just resuming a working group call. This is a working group of the Advisory Board on Radiation and Worker Health. My name is Lew Wade, and I generally serve as the Designated Federal Official for the Advisory Board. As I'm not able to be in Boston for this meeting of the working group, I've asked Liz Homoki-Titus to take on the roles and responsibilities of the designated federal official, and she's graciously agreed.

Just to set the tone this is a working group that looks at issues related to site profile reviews as well as individual dose reconstruction reviews and procedures reviews. Today, the working group is addressing itself to two site profile reviews. This morning they worked very hard, and I think made a great deal of progress concerning the Y-12 site profile and its review, and this afternoon is devoted to the Rocky Flats site profile and its review.

What makes these two discussions of site profiles

particularly important and timely is in both cases we're looking at SEC petitions that are active concerning the sites. It's the Board's desire to see issues raised in the site profiles resolved to the degree possible before the Board has to take up and vote on an SEC petition. It is certainly NIOSH's intention to present the Rocky Flats SEC petition recommendation to the Board prior to its April 25th, 26th and 27th face-to-face Board meeting scheduled for Denver, Colorado. The Board has also scheduled a call of the full Board for 10:00 a.m. to 5:00 p.m. on March 14th. So this working group that normally looks at site profile issues is continuing to do that but with special emphasis on those issues that can be identified as being particularly pertinent to the Board's deliberations on the SEC petition.

There's been work done already towards this end, and I'll turn it over to Liz to make any comments she might and then to the able Chair of the working group, Mark Griffon. But that's what we're here to do. The working group will continue tomorrow, but tomorrow starting at 9:00 o'clock it will be dealing with issues related to individual dose reconstruction reviews and possibly procedures reviews. So just to set the stage, Liz, anything you would like to say?

MS. HOMOKI-TITUS: I just want to remind everyone again

that if you have legal questions, they should be addressed to Emily as I'm here in the position of DFO; otherwise, I'll turn it over to Mark, who I believe wants to give a summary of the Y-12 discussion briefly.

MR. GRIFFON: Or try. Yeah, I'll start off and try to be brief with this because I know we want to get right into Rocky, but I thought it would be useful to go through Y-12, sort of the action items from what we discussed this morning. And if I miss any, certainly feel free to chime in, those who are still here.

Going through this in order, with regard to the data validation question, I think we had an action that NIOSH/ORAU are going to pursue this question of bioassay logbooks further and see as to whether they can obtain any and how best to use that to check the reliability of the CER database with the Y-12 database.

Action two is to look at the broader data view -- am I using the right term here? Data view image capture -- or Delta view, I'm sorry, Delta view, to look at the broader set of Delta view images to consider all the uranium data or to see if there's other, are there more uranium data since that was a source based on other nuclides other than uranium. So they were going to consider other uranium data in there and to see whether it fits into the current coworker model, whether the current coworker

model is bounding of that data.
Item three, action three is the 6,000 page -- and I'm not sure I specifically listed this or mentioned this as an action, but Mel Chew presented a spreadsheet analysis for the 6,000 pages that he had put together. I think it was mainly for the internal side of things. And I was wondering if that could be made available to the Board or SC&A or both. It seems like it, I guess with the understanding that it's total draft form.
DR. NETON: Yes, it's 90 percent complete or something at this point.
MR. GRIFFON: Right. And the fourth item along those same lines, Mel had some documents that he used related to the production history, and George said that he had other, George Kerr mentioned he had other documents related to the Calutron/cyclotron production history, and if we can get those posted. Some of them I think might be already, but if we can get sort of a listing of what was used and posted on that board drive it'd be easy to find.
DR. NETON: That special subdirectory, the Advisory Board. If people provide them to me, I'll make sure they get into the right location.
MR. GRIFFON: Action five, this is one that Mel mentioned, was to confirm by looking at the names in the

Delta view database for lack of a better term that the Y-12 people did the maintenance. I guess that's something that you already have done, right?

DR. NETON: Right.

MR. GRIFFON: So that's probably not an action item, sorry about that.

The next action item, action item five, Oak Ridge, ORAU will give a production history for the Calutron/cyclotron or look into filling in some of those documents to give a better production history of different campaigns that went on through there. I think that'd be useful for all of us.

No specific action related to this, but I think it was mentioned that this question of the U-233, the plutonium and the thorium, other nuclides outside the cyclotron/Calutron still needs to be addressed, but that's been on the table before.

Also, another action, and I guess this is currently being worked on, just wanted to make sure we got it on the record that there's a new model being developed for extrapolation of beta dose at Y-12. And I'm not sure if that is an action within the site profile review or I know that came up today.

DR. NETON: Yeah, this has come up before where we need to have some shower-dose models, skin dose.

MR. GRIFFON: So that's -- and George seemed to think it was in final draft form or close to completion so that's another action.

Item eight, a question as to whether the highest classed individuals were monitored for external radiation. And I discussed with George Kerr some of the concerns or questions I had about the assembly work specifically, and George said that he would work with Bill Tankersley on responding to that question. Some of it delves into some classified questions so I didn't want to go into it too far here.

Item nine is SC&A agreed, and I think this would also go for NIOSH, to identify types of sample cases that we might want to consider in our final part of this SEC review process. So whether we want to look at a case with a neutron exposure or a polonium exposure, what types of cases do we want and let's try to outline some cases so we can get some sample cases out there.

And that's all I had. Do other people have, did I miss any actions?

DR. MAKHIJANI: Mark, the external dose sort of Delta view database comparison with the CER database, if we could see the compilation of that analysis, the 60 that you started with.

MR. GRIFFON: Yeah, if we could see that.

DR. MAKHIJANI: It would be useful to have that.

MR. GRIFFON: Let me just get that down. I think that's it. Is that everything?

(no response)

MR. GRIFFON: I think we're on to Rocky then, and if it makes sense to work from this matrix. We're going to work from a matrix that we used at the last meeting actually dated December 6th, 2005. So if people have access to that document, they might want to look for it now. And before we start, maybe we should just go around the table and have everyone introduce themselves because there's new people on the phone, and there's some new people around the table. So I'll start. I'm Mark Griffon chairing this working group, a member of the Advisory Board.

MS. MUNN: Wanda Munn, Advisory Board.

MR. GIBSON: Mike Gibson, Advisory Board.

MR. FITZGERALD: Joe Fitzgerald, SC&A, support contractor to the Advisory Board.

DR. MAKHIJANI: Arjun Makijani, SC&A.

MR. LITTLE: Craig Little of the ORAU team.

MR. LANGSTED: Jim Langsted of the ORAU team.

DR. FALK: And I'm Roger Falk, and I'm part of the ORAU team.

MR. MEYER: Bob Meyer also with ORAU.

DR. ULSH: I'm Brant Ulsh with NIOSH.

DR. NETON: Jim Neton with NIOSH.

MS. HOMOKI-TITUS: Liz Homoki-Titus with HHS.

MR. RUTHERFORD: LaVon Rutherford, NIOSH.

MS. HOWELL: Emily Howell with HHS.

MR. SHARFI: Mutty Sharfi, MJW.

MR. GRIFFON: And on the phone, if we could have people introduce themselves. Are there members of the petitioning class on the phone?

MS. McDOWELL-BOYER (by telephone): Laura McDowell-Boyer, I'm with the ORAU team.

MR. PRESLEY (by telephone): This is Bob Presley with the Advisory Board.

MR. BURN (by telephone): John Burn, with the ORAU team.

MS. WORDER (by telephone): Amy Worder with Congressman Bob Beauprez.

MS. LOPEZ (by telephone): Teresa Lopez with the ORAU team.

MR. ROBINSON (by telephone): Al Robinson with the ORAU team.

MS. BOLLOR (by telephone): Carolyn Bollor with Congressman Udall's office.

MR. HILLER (by telephone): David Hiller with Senator Salazar's office.

MS. ALBERG (by telephone): Jeanette Alberg with Senator

Allard's office.

MR. DeMAIORI (by telephone): Tony DeMaiori and Jennifer Thompson with United Steel Workers.

MR. KOTSCH (by telephone): Jeff Kotsch with the Department of Labor.

DR. WADE (by telephone): Lew Wade with NIOSH.

MR. KATZ (by telephone): Ted Katz, NIOSH.

MR. SUNDIN (by telephone): Dave Sundin, NIOSH.

MR. STEMPFLEY (by telephone): Dan Stempfley, ORAU team.

MR. BUCHANAN (by telephone): Ron Buchanan, SC&A.

DR. BEHLING: Hans Behling, SC&A.

DR. MAURO (by telephone): John Mauro, SC&A.

DR. GLOVER (by telephone): Sam Glover, NIOSH.

MS. JESSEN (by telephone): Karin Jessen and Tim Vitcus*, ORAU team.

DR. LIPSZTEIN (by telephone): Joyce Lipsztein, SC&A.

MS. (unintelligible) (by telephone): Ruth (unintelligible), SC&A.

MS. MUNN: Sorry, who, I didn't hear that last one.

MS. (unintelligible) (by telephone): Ruth (unintelligible).

MS. MUNN: Thank you.

MR. GRIFFON: Okay, I think that's it. We've got a lot of folks in the room and a lot of folks on the phone. If you could make sure on the phone that you speak up loudly

so our transcriber here can hear everything, and I'll try to do the same, actually.

ISSUE ONE: MDA VALUES

And like I said, we're going to try to work from this matrix from December 6th, and I guess I'll start with issue number one, and this is the question of mda. And I'll turn it over to Brant.

DR. ULSH: Issue number one is an important issue. It's the mda issue that SC&A has raised about plutonium and americium. However, this has not been presented as an SEC issue so I don't know if we want to discuss it today.

MR. GRIFFON: No, we're not going to go there.

DR. MAKHIJANI: Is that of high-fired oxides?

DR. ULSH: That's issue number two.

DR. NETON: That's high-fired oxides, but the mda issue in general I think we've agreed that it's --

DR. MAKHIJANI: Oh, sorry, Hans is on the phone so maybe he should --

MR. GRIFFON: Hans, are you there? Can you speak to this first issue?

DR. BEHLING (by telephone): Yes, we reviewed the mda values and realized that the median value makes certain assumptions that are somewhat unrealistic with regard to certain parameter values regarding time, efficiency, self-absorption, et cetera. And we felt that perhaps a

more appropriate value might consider at least two out of the four as extreme values which would raise the MD value by perhaps several fold. And I think we raised that as an issue in our review, and I think we feel that that NIOSH may want to re-evaluate their position on mda values.

MR. GRIFFON: John Mauro, are you on there?

DR. MAURO (by telephone): Yes, I am, and perhaps I can help a little bit on this.

MR. GRIFFON: Is this something you still consider an SEC issue, that's the --

DR. MAURO (by telephone): Not as a standalone, but when we get into the super-S issue --

MR. GRIFFON: That's where it comes in.

DR. MAURO (by telephone): -- what happens is that brings in questions related to mda because the starting point for the super-S issue has to do with what the mda level is that you're going to start with and what the implication of that is with regard to super-S and the doses not only to the respiratory tract but to the other organs. So I think that we can certainly move on to number two but keep in mind that I think the issue of mda is probably going to re-emerge as we talk about that.

DR. LIPSZTEIN (by telephone): May I comment a bit? The mda is important because if you start with bioassay

information then the missed dose, the size of the missed dose, is directly related to the mda. So the higher the mda, the higher the missed dose.

DR. NETON: Right, we understand that and acknowledge that. It's just that I think we all agree that it's what John would call a tractable problem in the sense that SC&A's position was that we would use some combination of these five parameters to come up with a much higher mda. Our position is it's somewhere in the middle, and then it's just a matter of not being able to bound these doses but where do we land on the missed dose issue.

DR. MAURO (by telephone): Yeah, Jim, I agree. Item number one as a standalone item is certainly a tractable issue, and I think we can move on to item number two and see what happens as we move through that and the role that mda may play there.

ITEM TWO: SUPER-S

MR. GRIFFON: All right, item two.

DR. ULSH: Item two is the infamous super-S issue. And this has to do with forms of plutonium at Rocky Flats that may be less soluble than type-S. And this came up both in the SEC petition that we received from the United Steel Workers and also in SC&A's review. So we are prepared to talk about that today.

We have a TIB underway, a Technical Information Bulletin,

that's TIB-0049 that's being developed. It's not yet been issued. Jim Neton is going to talk about the approaches that we're taking there, and I think the other thing to emphasize is that we are bouncing our approach in TIB-0049 against actual autopsy measurements from the Trans-uranium Registry, for Rocky Flats employees.

So I think that's about as good as the data can get. So I'll turn it over to Jim and let him tell you what we're going to do in this regard.

DR. NETON: Just to give a little summary, we believe this is an issue, I mean, it's a major issue because if material doesn't leave the lung then the current ICRP models as they exist are not applicable or relevant to doing dose reconstructions. There are three scenarios that are affected here in our thinking.

One is the issue of how does one calculate a lung dose given that the material clears the lung much more slowly than the current ICRP model. The second issue is how would one calculate a systemic organ dose, that is, once it leaves a lung and gets into the bloodstream and deposits in the systemic organs? And then the third issue is related to how would one calculate a gastrointestinal tract dose because if the material are in the lungs and they clear more slowly to the GI tract, then clearly the standard ICRP models might not apply.

We've spent a lot of time, and there's a team that Roger Falk was a member of who's at the table today, looking at this issue. There was a team put together with Roger Falk, Don Bihl and Tom LaBone, three fairly well-known internal dosimetrists who looked at what they call design cases. There are ten cases that have been fairly well studied. I think, Roger, nine of them were from Rocky Flats?

DR. FALK: That's correct.

DR. NETON: There were nine Rocky Flats cases where there were existing autopsy data and --

DR. FALK: Jim, excuse me.

DR. NETON: -- no, not autopsy data.

DR. FALK: No, all of those, most of those are currently living, but they are well-documented, high-level cases with lots of data.

DR. NETON: I'm sorry. I'm getting ahead of myself with the autopsy data. I didn't mean to speak improperly there.

So there are well-documented cases with multiple lung counts, chest counts, to determine the slow clearance of the activity in the lung. In addition, there are bioassay samples available. One of the cases that was looked at was also from Hanford which, I guess, Don Bihl was aware of.

In looking at these ten cases, and this is the basis for this TIB-0049 that we'll talk about, there were a number of different types of clearances. One could clearly see that the material left the lung with a much, much longer half life than super, than class Y, type Y, and in fact, exhibited these super-S clearance characteristics. Of the ten cases that were reviewed, the team decided to take the one that exhibited the most tenaciously retained plutonium. That is, the one that had the longest clearance half time, and there were two very similar. This so-called Rocky Flats case 872 as well as the Hanford one, also known as HAN-1. Since they were both similar, they picked one, and that was the HAN-1 case that was used to model this.

I wish I had the TIB available. Its release is imminent, but I'll give you the basics.

MR. GRIFFON: Do you have a TIB number for that?

DR. NETON: TIB-0049, it's in draft form. It's in internal review by NIOSH currently, so it's there. It's in fairly good shape. In fact, I expect it to come across my desk. I've seen draft copies. I expect the final to come across my desk for signature very shortly. What they've done with this design case is take the available urine and bioassay data for the lung and come up with its own, what they would call, a custom model.

It would give you the observed clearance in the lung for this particular design case which had the most tenaciously retained plutonium of the ten design cases. And that model was used to construct, well, you have a model that shows the differential clearance, and I would say that -- Roger, correct me. I think it was somewhere around an effective half life of around 80 years in the lung. It was a pretty long half clearance time.

So if one takes that model and then per becquerel unit intake comes up with an intake and then clears the plutonium from the lung with this new custom model one can develop those factors that will correct for the differential dose at any time post-intake for this super-S material. That's essentially the basis of this TIB. It has a number of look-up tables that include scenarios anywhere from food exposure one to 65 years post-intake and chronic exposures in a similar timeframe.

We've been looking at that and we feel that it adequately bounds these lung exposures. Now remember, the lung exposures, most of the lung cancer cases at Rocky Flats are compensable based on just purely looking at type-S because if you have any bioassay or we're on a bioassay and your plutonium and your urine was non-detectible, and you end up with some fairly large doses. There are some cases out there that were not compensable based on the

model, so we would propose to use this additional dose factors and apply that to the super-S material. That's the basis of 49.

But we've gone a little bit beyond just looking at developing this model. We've actually put in place a contract with U.S. (unintelligible) to obtain cases of plutonium from a number of locations around the country and look at super-S cases. We have 123 autopsy cases available at our disposal to evaluate this super-S issue.

And what we're currently doing are taking this TIB-0049 and comparing it to what we're actually seeing in autopsies analyses of cases from the Trans-uranic Registry.

And what I have here are a few slides to show where we are with that. And I apologize for the folks on the telephone. You won't have these slides because they're fairly late breaking, but I'll try to explain what's on the graphs as I go, talk about what super-S is and what (unintelligible) is, and where we are. We've seen a lot of issues at other places like the Mayak worker where we're seeing this tenaciously bound plutonium.

MR. PRESLEY (by telephone): Hey, Jim, this is Bob Presley. Can you speak up just a little bit more?

DR. NETON: I'm sorry, I need to speak into the microphone. I'm trying to look at the slide and talk at

the same time.

MR. PRESLEY (by telephone): Jim, this is Bob Presley again. Do you have any type of a worker breakdown for these people in job classifications?

DR. NETON: I don't think so, Bob. I think these were mostly anyone who was working with plutonium who would have been on the bioassay program itself.

We talked about how the fact that the current lung model is not applicable. We need to have some additional models. We developed this TIB-0049. I talked about how we were using this Hanford one case to correct for the activity expected to be in the lung at any time post-intake as compared to what the traditional S clearance factor would be.

Now we not only increased the lung dose, but it's also applicable to the lymph node dose. What happens is you come up with an intake of type-S and then increase the dose to any of the current lung compartments based on these factors. So here's what I'm getting to. We're taking a few test cases and looking at them to see how they apply. And what I'm showing here in the graph is how do we identify which of these 123 trans-uranic cases are actually super-S.

And what we believe is a great indication is looking at the ratio of the lung to the liver at any time post-

intake, if you look at the clearance graphs I have here, we mapped out what the ratio would look like for a chronic type-S and type-M intakes, acute and chronic. And this one shows a chronic intake of 50 years, and of course, you can see the other two lines are for the acute.

Notice that the ratio drops off fairly well, and in fact, you're down to around five to one or so further out on the graph. I have more of these. This is the same graph. It shows what happens when you have a shorter chronic intake. This would be a ten-year chronic intake. My point here though is to show these are the graphs that one would expect, but what you end up with is these three little dots on the graph here.

You can't quite see, but there's two here. This case here is an actual autopsy case well, well above the line which would be very indicative of super-S material. In other words, the amount of material in the lung relative to the liver is way elevated compared to what we're seeing for these other two cases. So we're using this as a screening tool to pull out cases that have been exposed to super-S material.

We managed to take one case thus far out of these and compare it to the TIB-0049 model. Remember, the TIB-0049 model is already based on real human data. I mean, these

were ten folks, nine of whom had work histories at Rocky Flats working with the same material we're trying to reconstruct. We're just taking this one step further and looking at autopsy analyses.

Here we have a test case one from the Trans-uranic Registry whose employment began in '52 who had no positive urine samples in his early career when the mda was fairly high. In '65 when the mda went down, you're starting to see positive urine. Had been involved in a couple incidents with high air concentrations, was there during the fire, but not near it necessarily, and had a slight positive americium peak in his lung count after the fire in 1965.

This slide just shows the urine data showing that there were non-detectibles up until 1963 and '65. I think, graphically, I've got on the next slide it shows what happens here is early on these are the non-detects, and then we've got the two positive samples.

If one were to model this with a standard-type-S model, you'd actually get a pretty good fit, and then we would project after that intake is over it would drop off using either S or M. But we know if this were type-S, super-S, that this clearance curve would not be anywhere near what is shown on that graph.

MR. GRIFFON: Jim, is that red line is that

(unintelligible)?

DR. NETON: That looks to me like the reporting level. It's .8 (unintelligible). It sounds to me like the reporting level at that time period.

MR. GRIFFON: So the detection limits would have been below .2?

DR. NETON: No, not below .2 in the early years. That may actually even be detection limits. I'm not quite clear to be honest with you.

DR. FALK: Point nine is the reporting level in the early years based on what they called ten percent of the tolerance limit based on some very (unintelligible) models that were essentially in place at that time.

DR. NETON: So whether it's a detection limit or a reporting level, we don't have, you know, this would be reported as zero essentially. But anyways it's quite interesting how this curve fits. But let me show you what happens when we evaluate it against the super-S model. Remember, this is an autopsy case. We have real data.

Here's what the super-S curve looked like I showed on that previous graph. And here's where his autopsy result falls on our super-S model. Now, I'll grant you N = 1 is not a robust statistical test, but remembering that the original analyses were based on real human data, now

we're taking some autopsy data with real analyses of the combined lung and lymph nodes, we're very close to the right ballpark here with this model is the way it looks to me.

I'm just showing you this as an, I'm going, again, we had 123 cases of which to screen. Not all of them, of course, are going to be applicable, but we believe that we can show that this model is fairly good for these particular scenarios.

This again is just the graph on what the projected difference in the doses are for using the custom model for super-S versus what the type-S model would be. And so what you'll see in TIB-0049 is a bunch of factors. Let's say what is the difference per year in dose to the lung? What factor do I apply as I go out recognizing that this material clears with a very long half life on the order of 80 years.

That's what we've done, so I think this takes care of the lung, I think this is a great step towards resolving the dose to the lung recognizing that most of the lung cancers are already (unintelligible), we're going to apply these other factors to make sure we're not underestimating the lung doses to the super insoluble material.

MS. MUNN: It should be an adequate overdose for anyone.

DR. NETON: They're fairly hefty doses. You can get some pretty good adjustment factors because even though S is insoluble, super-S, again, is not going very far.

DR. MAURO (by telephone): Jim, did I hear you correct? That is, the long component for clearance from the lung under your super-S was an 80 year half life?

DR. NETON: Well, you know, you've got to be careful. I say that. It looks as if it's in that ballpark, but the ICRP 66 model is much more complicated than that. It's not, you can't put a time on any of the compartments like you could in the old 30 model. It's just much more complicated than that, but let's suffice it to say if you plot out these data points, it looks like the lung counts over time are clearing on average with a somewhere in the vicinity of an 80 year half life.

DR. MAURO (by telephone): Now that being the case, and if you want to just look at it very simply from the point of view from the dose to the lung, couldn't you simply say that, well, let me see, if you're looking that data, you're saying that you're looking at what's in the urine, and you're looking at what was measured in the urine. And I'm not looking at the graph, of course. And then you're looking at what the autopsy data show is in the lung.

So you're getting a relationship between, I guess,

activity in the lung as compared to, you could almost say becquerels(unintelligible) in the lung or becquerel per day excreted in the urine. In other words, some kind of simple relationship. I'm not quite sure, you know, what's the relationship that you're establishing here? Is it some factor that gives you --

DR. NETON: Yes, it's a dose factor, the difference in the dose to the lung if it were type super-S versus if it were type-S. So these are dose factors that are applied to each case.

DR. MAURO (by telephone): And you're seeing factors that are how much larger than that when you're --

DR. NETON: It varies well over time but in some years I think it's approaching -- I don't recall -- around 100 maybe.

DR. MAURO (by telephone): About a hundred-fold higher, okay.

DR. NETON: In some years. If you could see the graph, 25 years out it's peaking at around 100. It climbs fairly rapidly from fairly close in the early years up through to about 100 and then it drops off to where 30 years out or so you're maybe a factor of, it could be a factor of five to ten. But there's a factor of 100 in the tables. I'm not sure exactly what…

DR. FALK: What the tables are is the ratio of the lung

deposition for the cases HAN-1 and also Rocky Flats 872 relative to the deposition calculated from using the assumption of the regular type S for the same intake. So it's basically ratios of the observed very avid retentions for our design cases versus standard type-S per calendar year. Now the main reason why the ratios go up over time is the fact that there is very little retention predicted by the type-S at the long-term basically, even though the actual deposition may be flat over 30 to 40 or 50 years.

DR. NETON: This is a fairly complex analysis, and I'm probably not doing it justice by talking about it. I think if we can get this TIB-0049 in front of you in the next week maybe. I don't want to promise that but it's about ready to go, then you can certainly have a go at it and take a look at the appendix and see where there's actually the design of the model and what it looks like. But that's what we're proposing that we're going to have these adjustment factors based on real data to account for the fact that site-type super-S clears more slowly. I think that, and when you're going to take a look at it, we'd appreciate any comments you might have.

DR. MAURO (by telephone): Jim, this is John. I think we also are convinced that at the NDL, this is where the NDL comes in, at the NDL whatever you pick for one-half the

NDL whatever you pick, the doses to the lung, whether it's S or super-S, whatever kinetics you assume for super-S, even for S, the dose to the lung, I guess, and the lymph nodes are going to be off the charts. That is, you're going to have POC that's greater than 50 percent. The dose is going to be very large.

And I think that we're fairly, I mean, we've done enough calculations ourselves to convince ourselves of that. The place that we start to run into a little bit of trouble, that we're struggling with also is other organs like the liver and the bone.

DR. NETON: That's what I'm going to get into next.

DR. MAURO (by telephone): Yeah, how to come to grips with that.

DR. NETON: I would put a caveat on the, their all going to be off the charts, because you've got latency issues here --

DR. MAURO (by telephone): Yes, yes, I agree. I agree completely.

DR. NETON: -- where if a person develops lung cancer within one year, you can give them very large doses and it won't get the 50 percent.

DR. BEHLING (by telephone): Jim, this is Hans. Can I just interrupt for a second? The issue that you just discussed with John we agree, but there is an issue now

that comes into play when we talk about perhaps and exposure that is less than the 250-day requirement to be eligible to submit a claim. If you do have super-S and the doses to the lung are excessively high, a person who may be employed for a period of less than 250 days may, under the old system, be denied a chance to submit a claim when in fact for super-type-S the lung dose for even a very brief exposure may be such where the exposure may result in a POC greater than 50 percent.

DR. NETON: I'm not following you, Hans.

DR. BEHLING (by telephone): The question that I have is I agree with everything you said about chronic exposures in excess of 250 days if, in fact, it is super-type-S or F either one would inevitably result in a POC value greater than 50 percent. But given the much higher lung dose for super-S perhaps an exposure that well below the 250-day requirement may nevertheless result in a dose to the lung that far exceeds 50 percent, and yet we would say you haven't worked long enough to even qualify for submitting a claim.

DR. ULSH: So the logical extension of what you're saying, Hans, I think is that if we adopt this new procedure that we're talking about for super-S, there are certain lung cancer cases that may be better off under this procedure than under SEC for which they may not

qualify because of their 250 days. Is that what you're saying?

DR. BEHLING (by telephone): Yes.

MR. GRIFFON: Or the question of that definitely is going to help (unintelligible).

DR. NETON: But we're not really discussing here whether or not it's more or better a merit to be SEC or not. We're trying to discuss technically can we do these dose reconstructions. And I don't disagree with what Hans said, but I'm not sure that's for this working group to discuss.

MS. THOMPSON (be telephone): This is Jennifer Thompson with the Steel Workers. I'm wondering if we are going to have an opportunity to ask questions during this or if we need to submit our questions via a different avenue.

MS. HOMOKI-TITUS: If it's a petitioner, they can ask questions.

MR. GRIFFON: This is Mark Griffon. You're welcome to ask questions during the presentations like we're all doing so do you have something now?

MS. THOMPSON (by telephone): Great, yeah, we have a few. We're wondering under the new technical direction how will you know which form of plutonium a worker was exposed to? So how will you know which model to apply? Are you going to use the super-S for all Rocky Flats

workers?

DR. NETON: The standard answer for that usually is that we'll do whatever we believe to be the case for the worker, and when we don't know, we would pick the most favorable for the worker.

MS. THOMPSON (by telephone): So you would base that then on where the worker worked? If they worked in the building with the potential for high-fired oxides exposure then you would use the super-S model?

DR. NETON: Yes.

DR. ULSH: Well, there's a caveat there. Using super-S is not always going to be claimant favorable. It depends on where the cancer is located. Certainly, if it's lung cancer or respiratory tract cancer it's claimant favorable to apply super-S. If it's a systematic, I'm sorry, a systemic, cancer in a systemic organ, it would not be claimant favorable to apply super-S. And then there's a point that we need to discuss further is GI.

DR. NETON: Right, but we would play through all those scenarios or work through those scenarios and if we didn't know, if we truly didn't know what the chemical form was, we would pick the one that gave the highest dose.

MS. THOMPSON (by telephone): Okay. And then I'm wondering, when you're looking at these like Rocky Flats-

872 and Hanford one, how are you knowing how much plutonium is in their lungs?

DR. NETON: The Hanford-872 or the Hanford one and the Rocky 872 had a lot of lung counting data, chest measurements, to determine the actual quantity that was in the lung itself at any given time. And then many of these were followed up thousands of days after exposures.

MS. THOMPSON (by telephone): And how did that data take into account the ceramified particles from high-fired oxides?

DR. NETON: Well, what it shows is if you sequentially measure these people over a long period of time, it will show that -- sorry, Roger has his hand waving here.

DR. FALK: Let me answer that because case 872 was a case the 1965 plutonium high-fired oxide so his case does actually represent the more, does represent the most extreme situation, and in fact, six of the nine Rocky Flats cases were cases from the 1965 plutonium fire.

MS. THOMPSON (by telephone): Right, and that's great, but my point is I believe I understood that case number 872 is still alive, and so my question --

DR. FALK: I don't think case 872 is, but case 872 did not participate in the Trans-uranic Registry Program; and therefore, we do not have autopsy data.

MS. THOMPSON (by telephone): Right, and so this gets

back to my question of how would you know how much plutonium was in that person's lungs based on the fact that plutonium particles from high-fired oxides are ceramified and have self-shielding properties that lead to a less than accurate depiction in lung count in terms of the quantity of plutonium present in the lungs?

DR. ULSH: If I could just jump in before Roger gives you the technical answer. Jennifer, I think you're referring to one of the questions that was raised in the SEC petition. This is actually in one of the seven bases where the assertion is made that these high-fired plutonium oxide particles exhibit some kind of self-shielding so that it would not be, it would be under-detected in a lung count. Am I correct in that?

MS. THOMPSON (by telephone): Correct.

DR. ULSH: Okay, now I'll let Roger talk about that if he would like to.

DR. FALK: Yes. The measurement of the plutonium deposition in lungs and based on the measurement of the 60 keV gamma from the americium. And the americium is a reasonably penetrating-type of a gamma photon. And we are dealing with reasonably small particles; therefore, there should be very minimal self absorption of the 60 keV gamma by the particle itself. That is more of an issue for the alpha radiation which is actually what

gives the dose to the lungs. So that is not a big issue. It is not an issue at all with regard to lung (unintelligible) for 60 keV gamma.

DR. ULSH: And if you take this question to its logical conclusion, if there's self-shielding by the particle so that you can't detect it in a lung counter, it's also not going to irradiating a lung. It's not going to be delivering dose to the lung.

MS. THOMPSON (by telephone): That's not necessarily true. The lung counter is much further away from the lung than the lung itself from the particles so you can't make that direct assumption. And there is a case, and in talking to Dr. Bob Fieswine* in the one specific case at Rocky Flats where a worker's exposure went undetected by lung count. And then decades after this person left the site, all of a sudden his urinalysis started showing spikes of plutonium. So that's what we're basing in part that assertion on. And so that would still support the idea that lung count in instances of high-fired oxides might not be the most accurate way to determine the content of plutonium in somebody's lungs.

DR. FALK: I think there is basic misunderstanding about the case that Dr. Feiswine* has mentioned.

MR. GRIFFON: Is there a case number for that case by the way? That one that she's referencing?

DR. FALK: I'm trying to actually recall it. I can't give you the actual case number. But this was a case for a worker who actually did not receive a lung count at Rocky Flats, and then when he came back in 1994 under Bob's program for the medical monitoring program, we did lung counts and did urine sampling, and yes indeed, we did detect high levels of the americium count in the lungs at that time as well as elevated plutonium count in this person's urine sample. So that was the issue that, yes indeed, we did measure americium in his lungs at a fairly significant level about 40 years after his actual exposure which was in the mid-'50s.

MS. THOMPSON (by telephone): And was that a case of -- I'm unsure whether we're talking about the same individual so we'd have to follow up on that.

MR. GRIFFON: Well, at least we have this issue on the table. Is there a third question you had and then maybe we can, because I think that's going to come up again the in vivo detection limits and things like that we're going to discuss further.

MS. THOMPSON (by telephone): Right, and I might like to get an e-mail address to submit some of these other questions because I only asked one that I think is of high significance just in the interest of time, but I have several others.

MR. GRIFFON: Sure, I'm sure we can make arrangements through NIOSH so that any questions you have can be --

DR. NETON: Any questions you have you can send to OCAS, O-C-A-S at C-D-C.gov. We have an e-mail address, and we'll receive it. We'll try to answer these questions within a day or --

MS. THOMPSON (by telephone): Would you repeat that, please?

DR. NETON: It's OCAS, O-C-A-S. That stands for Office of Compensation, Analysis and Support. OCAS@C-D-C.G-O-V.

MR. GRIFFON: Should they put Rocky SEC Petition or something?

DR. NETON: Yeah, Rocky SEC Petition in the subject or something to that effect, but we do monitor --

MS. THOMPSON (by telephone): The last one for right now. I want to know how many case studies or autopsy data you're using that are from D&D workers. Workers who worked at the site during the last ten years because D&D work in buildings where high-fired oxides are present from (unintelligible) fires and high temperature processes are substantially different than past production work in that the work was done in known airborne contamination environments.

And we know from the Building 771 incident that some exposures can go undetected by workplace monitoring

equipment and may not show up in bioassay right away and then show up later. And that was the conclusion of the 771 investigation. So I want to know how that's being accounted for in this process.

DR. NETON: I don't know if any of the D&D workers are in these studies. Since they're fairly contemporaneous exposures, I don't imagine they are and they're fairly young folks. But I think our position here would be though that the behavior of these super-type-S materials would not be different in a D&D environment than they would be, for instance, in the fire. Of the ten cases we've looked at, we took the tenaciously retained type-S material and modeled it. And I don't see why the D&D environment would lead to more insoluble plutonium than what we've observed in these cases. I'm not aware of any physical mechanism that would make the D&D environment plutonium more insoluble than, say, the plutonium that was generated during the fire.

MR. GRIFFON: I think there's some of us that we really need to see TIB-0049 to sort of gel all this stuff together. I mean, I myself have some questions about how you used the autopsy data in the modeling from that because I think you had to rely not only on autopsy data, but on intakes estimated by the sites, so we're going to back to --

DR. NETON: Well, no, the model, TIB-0049 is based on bioassay data from the lung counter themselves and the urinalysis data. To that extent we do need to rely on the site's bioassay data.

MR. GRIFFON: Then you're using the autopsy to confirm?

DR. NETON: The autopsy is confirmatory only. You won't see any of these autopsy samples in TIB-0049.

MS. HOMOKI-TITUS: When the people on the phone start speaking, please identify yourself for the court reporter.

MR. GRIFFON: And just one other thing before you move on, Jim. As the petitioner just raised some questions, I realized when, I think, the Rocky Petition actually got amended after we got the initial copy of the petition -- and I'm not sure all of the Board has the full petition. I understand it's a very large document. I just wanted to make sure that if it wasn't sent to us originally, if we can get the entire thing provided to the Board and SC&A. I think that's pretty important.

DR. NETON: Do you think that the petition was amended and you don't have the amended language?

MR. GRIFFON: I don't think we got the amended portions.

DR. NETON: We can check into that and make sure that everyone has the most current.

MR. FITZGERALD: Does the petition include the request

for additional information (unintelligible) TIB process of information being collected for petitioners being added to the (unintelligible) as clarifying information? I'm just trying (unintelligible).

DR. NETON: Well, that's certainly part of the entire petition package. Now I guess what you're asking is that all on our website?

MR. SUNDIN (by telephone): This is Dave Sundin with NIOSH. We did send both portions of the petition out to all Board members. There was an initial petition and then a supplemental, fairly large petition to deal with questions that were raised during our development.

MR. GRIFFON: Okay, I just wanted to check on that because I haven't opened the supplemental yet, so I just wanted to make sure we got, before the next meeting we had all of it.

DR. ULSH: If I can ask you to maybe take a look at what you got and make sure, and if you still have questions let us know, and we'll get it to you.

MS. MUNN: I'm unfamiliar with what the 7-7-7 report is. What was that?

MR. GRIFFON: Seven-seven-one.

MS. MUNN: Seven-seven-one?

MR. GRIFFON: Building 771 investigation report, was that -- Roger, you can probably --

DR. FALK: All I know is what I read in the petition, and it was in the (unintelligible), probably in the last three or four years where there were some workers that had positive fecal samples. But I was not privy to that investigation, and so I don't know the details of it.

MS. MUNN: But it was recent?

DR. FALK: Yeah.

MS. MUNN: We're talking about recent workers?

DR. FALK: Yeah, it was since 1995 and probably since 2000.

MR. DeMAIORI (by telephone): This is Tony DeMaiori with the Steel Workers. The 771 incident was in I believe 2000, and we had 11 workers that came up high in bioassay sampling that the body counters didn't detect with no known incidents. And so there was a complete investigation done by the employer, Kaiser-Hill.

DR. NETON: These were fecal samples?

MR. DeMAIORI (by telephone): No, they were urinalysis, and then they followed up with fecal, but the initial catching of it was the urinalysis.

DR. NETON: I've got two other conditions to talk about if we're ready to move forward. I don't want to rush anyone, but my sense is we've concluded that part of the plot.

The second issue I'd like to talk about is the systemic

organ dose issue. And that's related to what happens to the organs such as the liver and the kidneys and those organs that are connected to the blood system after the material that is deposited in the lung leaves there and becomes systemic. You know, one sort of (unintelligible) we can think about this and say, well, if the material's staying in the lungs with an effective half life of 80 years, there's not much getting into the system and so those doses are low. That doesn't necessarily give us an answer to what the doses are.

So in looking at this we believe that if we apply our normal chronic exposure models, that is, these workers are monitored and we have bioassay data for these workers over time, the integration of the amount of plutonium that is in the urine is a very good indicator of the total systemic deposition because it can only get to the organs in the system if it's in the blood and gets there in a certain fraction, known fraction, of material that's in the blood comes out in the urine. So the urine is a good integrator over time of the amount of plutonium that's become systemic.

We believe that to be the case. We've looked at this with some of these autopsy cases, and what I have on the graph here is one of the Trans-uranic Registry cases where this is what one would predict is the amount in the

liver if it were type-S or type-M and the dot well below the line shows that the autopsy liver result is well below what would predict to be the liver based on either S or M.

So in this sense, we believe that if we use type-S or M clearance parameters from the lung and model the doses for this person, and indeed any of the claimants, we will be assigning systemic organ doses that are above what one would have experienced if this were truly super-S.

MR. GRIFFON: See, this is where my question comes in on the autopsy data because somehow you have a measurement in the liver in your autopsy.

DR. NETON: In 1980, started employment in, and this would assume a chronic exposure scenario.

MR. GRIFFON: And you assume some intake though, right?

DR. NETON: Yeah.

MR. GRIFFON: So the intake came from data, I mean --

DR. NETON: I don't know whether this would be, I'm not quite clear on this. This is late breaking, but let's say a person had no positive bioassay results in their entire employment history. They've had an annual urine sample from 1950 through here. We would use that mda as an indication of what their chronic intake was for the history of their work and come up with a value of how much was being deposited in the liver systemically. And

what this shows is if we do something like that, we end up with an overestimate of what was actually observed in autopsy cases.

Now this is N = 1(unintelligible), I'll grant you that again, but I think this is going to hold for many of these cases.

DR. GLOVER (by telephone): Jim Neton, this is Sam Glover. That is the same case, Jim. That is the first, that is the same case you're looking at for the lung data. This is his systemic components for the same inhalation. You saw the urinalysis results before and his lung counting results, so this is what they found in his liver.

DR. NETON: Okay, so this is this same case. It's (unintelligible) saying that he was all mda, and so if we model this as a type-S base on a fit to the data, and then we go down and look at where his liver result is, is well below what we would have projected based on the model S or M.

MR. GRIFFON: So that's one person. I though that was a hypothetical autopsy.

DR. NETON: No, this is actually a person. This is that case that we had just shown. So it gives us some comfort that what we're saying is true. I mean, you don't see a lot of plutonium in the liver which is what you'd

intuitively expect if it's hanging out in the lungs so that maybe you're at half life. It just can't be in two places at once.

DR. MAKHIJANI: How frequently was this person bioassayed?

DR. NETON: It looks like he was sampled on an annual basis or so down in (unintelligible) '55 to '60-ish. Got a couple samples here. So our best reconstructed dose, this would be a traditional dose reconstruction if there were no super-S, we would have predicted this person had a type-S intake and given him this dose. Now we showed earlier the lung dose is going to be way up in here, but the liver dose, as we show with that autopsy sample, is down in here somewhere.

DR. MAKHIJANI: Now how do we know that the liver accumulation wasn't due to a type-M or some more soluble form of uranium because it could be a mixture of intakes and that you kind of mixed?

DR. NETON: But it could only be lower then. It's never going to be higher than F or S. The more soluble it is, the higher the liver value's going to be over time with a chronic exposure. It just has to be. It's leaving the lung, becoming systemic, depositing in the liver. The liver has a very long clearance time so the liver is a very good integrator of what your systemic burden had

been.
So I don't see any physical mechanism where, as the material becomes more soluble, that this value could actually go up higher. The more tenaciously it's retained in the lung, the less is going to get to the liver, and that's what this autopsy point shows. So if we model it as an S or an M, we're going to end up with an overestimate of the dose.
And if there were S or M, we're okay. We've done the right thing because it's at least that. If it's super-S, it's going to be lower than that. So that's our position on this. I think Sam Glover who's on the phone is looking through these Trans-uranic Registry cases to find more examples that fits this analysis.
MR. GRIFFON: I think that, for me anyway, some things are a little hard to do in real time. I'm looking at that graph and saying, all those non-detects, where is that detection, I mean, I agree with you completely, but I like to do the graphs.
DR. NETON: Over time, if you're giving a person the mda and it's inconsistent constantly, the only way it can get to the liver is from the bloodstream. So whatever's coming out in the urine is a good indicator of what's in the bloodstream. That's all I'm really saying here.
DR. MAKHIJANI: But the dose conversion factor for liver

for type-M is bigger than the dose conversion factor for lung type-S.

DR. NETON: It's the same. Once it gets in the liver it doesn't matter whether it was S, M.

DR. MAKHIJANI: Don't you have re-circulation between the organs?

DR. NETON: But once it becomes systemic, they all behave identically. The metabolic model is independent of the lung model. If it becomes in the bloodstream, it doesn't matter how it got there, it behaves the same. Once it's in solution in the blood there is no chemical difference in the body. It's how it dribbles into the bloodstream that's important, but once it becomes systemic it's irrelevant.

DR. MAURO (by telephone): Jim, are you saying that if we have, if we can establish a relationship between the integrated total amount of becquerels excreted in the urine, let's say over a 30-year period, and the dose to any organ?

DR. NETON: Yes.

DR. MAURO (by telephone): That's the key, so we could bypass the whole IMBA concept of models and simply have a relationship whether the IMBA-based or empirically-based, I guess I'm not quite sure, but you feel that the integrated release excretion in the urine is directly

proportional to the dose of any organ other than the lung? And I guess, and the lung and the lymph nodes, but if you are concerned about a dose to the liver, let's say, bone, kidney you could actually develop such a relationship?

DR. NETON: We don't really have to though, John. Because all you have to do is feed the system, and if you can't make it type M, and you're feeding the system over a period of ten years, it's a reservoir that's feeding into the bloodstream, and let's say they're all below the mda, and you just have to feed enough material in there to be at the mda over time, and IMBA will calculate a dose for it. I mean, it really -- Roger has something --

DR. FALK: It probably is fairly important to think about the probability of the causation rather than total dose because for the optimum probability of causation you want to get the plutonium into the organ quickly and basically type-M does that, whereas, type-S and type-SS dribbles in there slowly. Therefore, even though you may have the same organ dose, the probability of the causation depends upon when prior to the onset of the cancer. So that is something we really to be thinking about also.

DR. NETON: I think probably type-M would be the better solution where you would, it would clear the lung fairly rapidly, maintain the systemic burden or if you have a

chronic scenario over time, you're systemic burden is at a constant level being fed by this chronic inhalation. So then you're just taking the material from the lung, transferring it to the systemic compartment, and you're excreting a certain portion which is what you'd be using to base your dose on in the urine, but there's a known partitioning between the blood and the organ.

DR. MAKHIJANI: Sorry, I mean, I'm doing real-time questioning here. We obviously need to look at TIB-0049.

DR. NETON: Well, this is not in TIB-0049 by the way.

DR. MAKHIJANI: Okay, maybe slides. If you go backward, and Hans has raised this question before and Joyce is on so maybe they can correct me or amplify or whatever. I just want to put it on the table and maybe let the others take it up.

DR. LIPSZTEIN (by telephone): Arjun, I can't hear you.

DR. MAKHIJANI: If you have type-S and are starting from bioassay or super-S and are starting from bioassay, you're inferred lung burden is going to be very, very high compared to if you assume it was type-M. And then with that much, much higher lung burden and a slower rate of leakage from the lung, first of all, you won't get a steady state elsewhere because other organs are all the time accumulating this especially bone, for instance. And so you will never get to a steady state in any organ

in the body. And so the whole idea of modeling it as a steady state would appear to be not right. And you may get a higher dose because of the higher lung burden.

DR. NETON: I disagree with you.

DR. MAKHIJANI: Is that right, Joyce?

DR. LIPSZTEIN (by telephone): Yes, that's right, absolutely.

DR. NETON: Joyce, would you agree with me that up until the last bioassay sample the person leaves though, it doesn't matter.

DR. LIPSZTEIN (by telephone): I'm sorry; can you repeat again?

DR. NETON: If you have bioassay sample for, let's say every year, as long as that person's leaving bioassay samples, you have bounded the amount of plutonium in the system. The bioassay samples are directly correlated to how much is in the bloodstream. (unintelligible) is irrelevant. You would exceed the mda at some point, yeah, I'll grant you that. But as long as you have ---

DR. LIPSZTEIN (by telephone): No, no, no, no. It's not directly correlated, the urine samples are not directly correlated to what is in the systemic.

DR. NETON: Why not?

DR. LIPSZTEIN (by telephone): That's the problem. The urine, going out in the urine is not directly correlated

to what is in the systemic. There is some correlation, but it's not perfect.

DR. NETON: What I'm saying is that -- you have to believe, Joyce. I can't believe you just made that statement that with the amount that's in the urine is not correlated to how much is in the bloodstream. All the ICRP models are based on that basic premise that there is a certain amount in the blood that is excreted through the urine.

DR. LIPSZTEIN (by telephone): No, what happens is because you have values (unintelligible) blood then it's very difficult to -- let me rephrase it. What you see in the urine is correlated to what is in the systemic organs, but it's not a direct, well, it's direct, but it's not to be a perfect correlation coefficient. So depending on the day you measure the samples, the correlation coefficient will be different. That's one of the problems that we have with urine samples.

DR. NETON: Joyce, what I'm saying though is that in worse case, let's say that all of the amount measured in the blood is what came from the feeder compartment of the lung going into the organs. What you're saying is, yes, there's recycling between the organs, but that would just make the dose lower. If we assume --

DR. LIPSZTEIN (by telephone): The telephone is terrible.

I can't hear you well. Hello?

DR. NETON: What I'm saying is if we assume that all of the material that's in the systemic compartment, in the system, is coming from the lung and remembering that fraction in the urine, then that will be an overly conservative estimate of what's going into the organs. I know what you're saying. You're saying that there is a certain amount in the blood that's related to recycling from the systemic organs.

DR. LIPSZTEIN (by telephone): Exactly, yes.

DR. NETON: We're assuming that it's all coming directly from the lung and depositing into the organs.

MR. GRIFFON: So recycling, only lower.

DR. NETON: Recycling, only lower the dose.

DR. LIPSZTEIN (by telephone): Recycling will -- no, because it (unintelligible) back to the organs again.

MR. GRIFFON: I think what Jim's saying is his assumption would be bounding.

DR. NETON: Yeah, it's bounding. Whatever's coming out there's a certain fraction that's leaving the blood, and we're inferring how much is in the system at that time, time X. How much is available to be deposited in the systemic organs at some time post-intake. That's all we're saying.

DR. BEHLING (by telephone): But Jim, recycling will not

lower the organ dose, in fact, it raises it. Consider the option that nothing in from the blood to the urine and it's totally recycled. You wouldn't obviously maximize your doses to non-metabolic organ or metabolic organs.

DR. NETON: There is a known excretion fraction coming into the urine at all times post-intake for plutonium. The systemic compartment clears for the urine. That's how you can do bioassay --

DR. LIPSZTEIN (by telephone): Yeah, the compartments they clear to the urine, but they clear to the blood also. (unintelligible) again to the blood will come back to the organs --

DR. NETON: I understand that.

DR. LIPSZTEIN (by telephone): And a (unintelligible) to the urine also.

DR. NETON: Let's put our arguments on paper. We're not obviously going to get past this.

MR. GRIFFON: Yeah, I think we need to see TIB-0049 and the supporting documents we've got here, and then maybe we can move the ball after that, but we can't do it this way.

DR. LIPSZTEIN (by telephone): I think the only bottom line that I would like to see is that when you, what I agree with you is that when you calculate the lung dose

if you take the (unintelligible) retained from time, that's the best thing. But when you were talking about systemic this is not the case, and I think you said that, right?

DR. NETON: Well, I'm not sure.

DR. LIPSZTEIN (by telephone): So for example, if you are calculating the dose to the bone, for example, and you are, let's say, coming back from urine, okay? You have bioassay results from urine. If you use those 18 years that you were talking about for calculating the dose to the lungs, the dose to the lung for the 80 years half life is much higher than if you calculated with (unintelligible). But if you are calculating the dose to the bone, for example, or to the liver, if you take type-S coming back from urine samples, you will find a higher dose than if you used these 18 years.

DR. NETON: Well, I find that incredible to believe, but we'll talk about it, Joyce. I mean, you can't have a higher dose in a lung and a higher dose in the systemic organs at the same time. It's virtually impossible.

DR. LIPSZTEIN (by telephone): Yes, that's what I'm talking about. That's exactly what I'm saying.

DR. MAURO (by telephone): Jim, what I think I heard was type-S for systemic organs is more limiting than super-S.

DR. NETON: That's all we're saying. That's what I

started off with my conversation saying.

MR. GRIFFON: Yeah, we're in agreement there, I think.

DR. LIPSZTEIN (by telephone): We're in agreement, yes.

DR. MAURO (by telephone): But there is one --

DR. NETON: And there's even more (unintelligible) and that's all I was saying the whole time. I think we're in agreement here.

MR. GRIFFON: On that one, on that part anyway, yeah.

DR. NETON: Well, but that's our basis. Our basis is that S is more favorable to the claimant than S for systemic organs. That's all I said originally.

MR. GRIFFON: M is more favorable.

DR. NETON: And M is more favorable than S because it clears much more quickly. You know, you've got that lead time. There's a reservoir (unintelligible) the lung and clearing.

MS. MUNN: Can NIOSH and SC&A resolve single issue on a single phone call elsewhere?

MR. GRIFFON: We will. There was some documents to provide us. We'll go from there. I think we need to move on. Anything else on this topic because this calls for a break, too, so --

DR. MAURO (by telephone): Mark, before we break --

MR. GRIFFON: Hold on, John. Arjun's got a point and then you.

DR. MAKHIJANI: Jim's obviously put not only a lot of thought but done a lot of numbers with real bioassay data, and if we could just have these calculations which are not part of TIB-0049, but if we could just see the cases and the underlying data, I think this discussion will be just simplified.

DR. NETON: I think possibly we could schedule on of these technical conference calls among ourselves where were could take minutes and notes --

MR. GRIFFON: Is that data available? Do you know where that data would be, that kind of data?

DR. NETON: Autopsy case data would be available.

DR. MAKHIJANI: I mean, a conference call would really be productive. If we could see this in advance though, we need to see the numbers in advance.

MR. GRIFFON: Yeah, okay.

And John, you wanted to comment?

DR. MAURO (by telephone): Yeah, that's what I was going to say. It sounds like we need a subdivision of the working group because we've got a hot item here, and we're going to need a very, very tight, we're going to have to sit down and really roll up our sleeves and zero right in on this one.

DR. NETON: It sounds like we have a basic agreement. We're just coming at it from two different prospectives

so I think we can deal with that.

MR. DeMAIORI (by telephone): The steelworkers have a question. Tony DeMaiori. How many years does it take to refine a model before you can have confidence in its ability to accurately predict?

DR. NETON: That's a really good question. I think that the time required to refine the model is directly related to how close your subjects are to the data at hand. And we're using Rocky Flats workers for this model. Now we've had nine cases at Rocky Flats. We have 123 cases of plutonium autopsy data.

I think we can refine the model, and let me say what we do is we create the model, but then since we don't have time to refine it to the nth degree, we end up picking the most conservative case among the design cases to apply. So you end up being very conservative in your models. That is, pick the model that gives you the highest dose.

MR. DeMAIORI (by telephone): So what are we looking at, one year, five years, ten years to refine this model?

DR. NETON: TIB-0049 model is basically done. It's ready to go.

MR. GRIFFON: But, Tony, I think the other -- this is Mark Griffon, the other part of maybe the answer to your question is part of what we consider in this petition

process is the feasibility. And NIOSH is looking at that and the Board is also looking at that feasibility. It has a time element. So we will be considering that as we look as we go along here certainly.

MR. DeMAIORI (by telephone): Great, thank you.

DR. LIPSZTEIN (by telephone): And there's one more thing. We're doing a whole model it's just one parameter or two in the (unintelligible) sometime in the lung.

DR. NETON: Right, we're not developing an entire new lung model, Joyce, we're modifying a few parameters based on the data that we have, and that's clearly called out in the ICRP that allows you to evaluate case-specific data and develop a custom (unintelligible). It depends on how far you take that is where the litmus test is. The last thing I want to talk about and move on --

MR. GRIFFON: We're being called to a break so I don't know if this is --

DR. NETON: This will take just five minutes. Just this concept of the GI tract dose. That's a separate issue because if you think about it, we have, now you have a bolus of super insoluble material in the lung. It's not clearing very fast. Why it's not clearing is sort of a mystery almost because there are some people arguing that the chemical solubility is driving it to be slow or it's not as chemically soluble.

Some argue, and there's some good data to support this, that there is mechanical issues, mechanical clearance isn't there. This has been the case for workers like at Mayak where you have large lung doses, develop scarring of parenchymal tissue and it's just not, it's lodged in there. It's not moving out.

So again, one could sort of intuitively figure that any material that's deposited will clear more slowly in the GI tract and give a small dose, but the question remains what is the lung burden. We propose to use the urine data, the ratio of what's in the urine data for these test cases to the lung burden data and figure out, develop the additional amount of intake that is there based on urine data that we've seen from design cases, estimate that intake for super-S -- and then clear it with the standard ICRP clearance rate.

Right now, the ICRP model has no differential clearance for mechanical purposes. If it's D or S, W or whatever, it all mechanically clears it the same way. We propose to mechanically clear it with the standard default model which is probably an overestimate but we don't know how much to reduce it. We'll just leave it at the standard default. So we'll increase the intake based on the urine and then clear it with the standard mechanical clearance of the ICRP model. And then that will deliver --

MR. GRIFFON: The results are conservative you said.
DR. NETON: -- which is also conservative. So we believe we can do that. We don't have TIB on this (unintelligible) document, but that's our conceptual model.
MR. GRIFFON: Are you going to provide --
DR. NETON: Yeah, we'll provide documentation on all of this.
MR. FITZGERALD: Did you actually do the same kind of comparison using some fecal data of (unintelligible) Rocky to get to the same kind of --
DR. NETON: We need to do that. We haven't done that. We need to caucus with our internal dosimetry expert to see what fecal data may be available to do that. To my knowledge that has not been done for this project.
MR. FITZGERALD: I think what you're saying is that you feel the ICRP model, the default model, will be bounding.
DR. NETON: In the sense that the ICRP mechanical clearance model is independent solubility type. Mechanical clearance is mechanical clearance. It just clears like it does. The only difference in the ICRP model is that the chemical dissolution of the material is different. So we're going to use the default clearance model, the independent solubility type, to develop the (unintelligible). It's a reasonable approach. I don't

know any other way we can do it. We could slow down clearance. In fact, I think that the custom model, the mechanical clearance had to be slowed down to a certain degree to account for the long-term retention in the lung. But now knowing exactly how that works, we'd just be more comfortable (unintelligible).

MR. GRIFFON: Let's take a ten-minute break. And keep it short because we're going to try to adjourn 4:00, 4:30-ish, a short ten minutes.

(Whereupon a break was taken from 3:10 p.m. until 3:20 p.m.)

ISSUE NINE: DATA INTEGRITY

MR. GRIFFON: At this point I wanted to skip to, in the matrix, skip ahead to number nine, I'm being told. This is the Chair's prerogative. Is that what you're supposed to say? Because I have to leave a little early at four o'clock, and I want to cover nine which involves data integrity issues and ask NIOSH if maybe they can give us a report back on that to start.

DR. ULSH: Sure, we made a lot of progress on most of these issues. Comment number nine actually consists of about six -- the way I count them -- six separate issues and Joe Fitzgerald presented a slide at the I think it was the Oak Ridge meeting that laid out I think quite a few bullets, five or six or so, of programmatic issues

that they had questions about the reliability of the data. And those are laid out here in our comment responses. I might ask some of the ORAU team to go through and talk about what we've found so far on these issues.

Just to give you a feel for what kinds of questions are being asked after 1964 I believe it was dosimetry badges were incorporated with the security badges. And so there were questions about why there should be blanks or zeros in the record after that time if every was, in fact, monitored. Those are some issues that we're prepared to talk about. And there were a few other issues. So I'm going to turn it over to Jim Langsted to begin walking through this.

MR. LANGSTED: First of all there were a couple of comments that talked about the neutron dose reconstruction project needs to be documented in a tech basis document. And the sequence of this was that technical basis document was originally written while the neutron dose reconstruction project was still in progress. And since then the dose reconstruction project, neutron dose reconstruction project has finished up, they have published a document, and they have turned data for all of the claimants over to the Department of Energy that's turned it over to ORAU. So the results of

their work are now into the dose reconstruction project. I have written some sections that will go into the revision of the tech basis document that describe in general what the neutron dose reconstruction project was. And the dose reconstruction organization has written a technical basis or an OTIB that instructs the dose reconstructors how to use that data in the dose reconstructions.

What the file formats are that they're getting; what those numbers mean, and how to put that together. So that whole package wraps up now to give the dose reconstructors significantly more data than they had before in terms of neutron detail for those individuals the neutron dose reconstruction project did their work for.

MR. GRIFFON: Can you refresh my memory? Who did the neutron dose reconstruction?

MR. LANGSTED: The neutron dose reconstruction project was done by ORAU, another arm of ORAU, (unintelligible) and this guy here was the chief health physicist on that project, Roger Falk.

MS. MUNN: And the OTIB number you referred to?

MR. LANGSTED: Is number 50. And it has been approved and is out in, I assume it's probably in the packet that's gone to these guys or they'll be reviewing.

DR. NETON: SC&A?

MR. LANGSTED: I don't know if SC&A has seen that. No, this is the NDRP(unintelligible) TIB.

(unintelligible): No, we haven't seen it, but --

DR. NETON: It's out there on the standard drive. It was not specifically forwarded to you guys upon signing so I don't know whether you would need it or not. It's available on the standard network drive.

MR. GRIFFON: SC&A should review that. That'll be an action, I think.

MR. BUCHANAN (by telephone): Yes, this is Ron Buchanan. Yes, SC&A has reviewed OTIB-0050.

MR. GRIFFON: I'm sorry to interrupt, one more question on that. Did the supporting documents that you just mentioned, are those on the O drive as well, the report and all the, I mean, they're outside of OTIB-0050.

MR. LANGSTED: Yes, the neutron dose reconstruction project protocol which is (unintelligible) report --

DR. FALK: Is part of the Rocky Flats site profile documents.

MR. GRIFFON: Is this part of the site profile documents?

DR. FALK: Well, not the site profile, but the supporting documentation for Rocky Flats (unintelligible).

MR. GRIFFON: So it would, I just want to be able to find it.

MR. BUCHANAN (by telephone): This is Ron Buchanan again, yes, it was posted on the O drive February 7th, '05 is this date.

MR. GRIFFON: Okay, thank you, sorry to interrupt.

MR. LANGSTED: Completeness of the external exposure data unmonitored personnel. As we've discussed earlier I believe the dosimetry at Rocky Flats was not a hundred or not all employees were monitored initially at Rocky Flats. They did only monitor those that they felt would exceed ten percent of the radiological protection guide at the time. So that does create a challenge for the dose reconstructors to go back and reconstruct the dose for those individuals that weren't monitored.

But they have put together a program that does a bunch of maximizing assumptions initially to see if a person reaches the compensation limit or not. And then conversely, they've got some minimizing assumptions that they use to see if a compensateable person falls below the line. And if neither one of those, well, if they do fall above or below, thank you very much, they're either compensated or they're not. And if they're in the middle, then they go to a more rigorous and exacting dose reconstruction. It does require that they use the neutron or use coworker data and a neutron-to-gamma ratios in some cases.

One of the things that, the byproducts that came out of this neutron dose reconstruction project is a carefully evaluated set of neutron-to-gamma ratios for the early years, and the years through which the neutron dose reconstruction project analyzed data, another tool that's of value to the dose reconstructors.

MR. GRIFFON: Let's return to one for a second. It mentions in there the Ruttenberg data. Did NIOSH consider the Ruttenberg at all?

DR. ULSH: We're still attempting to get that.

MR. GRIFFON: He hasn't released that.

Sorry once again. Go ahead.

MR. LANGSTED: Let's see, there was a question about missed extremity dose. The neutron dose reconstruction project recognized that there were a group of workers, well, there have been a number of workers at or lots of workers at Rocky Flats that were not monitored for extremity dose. And again, the plant did not recognize or did not -- or not recognize, but these individuals were not likely to get significantly greater dose than to the extremities than to the rest of the body and so they did not put extremity monitoring on them. However, there were many individuals that were monitored for extremity dose if they were hands-on workers. So there is a good set of coworker data that can be used to estimate the

dose for those individuals, extremity dose to those individuals where it's needed.

And this frankly, is not, does not happen in a lot of cases because there's only a few cases where there are, and actually the dose reconstructors can tell you this, but there's only a few cases where there are really extremity cancers that need to be, where the extremity dose needs to be evaluated differently than the body dose.

Another issue that was recognized was the missing quarterly results. Even though Rocky Flats monitored everyone on plant site from 1964 through about 1991, the records show missing dose in some quarters of individuals' files. My experience at Rocky Flats, and I was there from '77 through '90, was that it was very unusual, in fact, it was an oddity to see someone on plant site that did not have a dosimetry badge on.

Now I was in the dosimetry business so I probably paid more attention to this than most people did. But I'll tell you what, if you didn't have a security badge on you weren't going to get very far on plant site, and the dosimetry badge was an integral part along with the security badge. So it was very unlikely that somebody walked around without a dosimeter on.

What happened, Rocky Flats did not have an extremely

tight exchange enforcement program. In other words, if a person was asked to exchange their badge on the badge board this following week, and they did not do that, Rocky Flats often did not follow up on that. Now workers that were monitored on a biweekly or a monthly basis their management was much tighter on that than individuals that wore a badge for a quarter. In fact, many of the people who wore badges on a quarterly basis in today's day and age would not need to be monitored and would not have a badge on.

However, what would happen then is the individual would end up wearing the badge for two exchange periods and so when the badges were processed and that individual's badge was not on the badge board, actually their new badge was still hanging on the badge board, did they recognize that, that badge would not get processed, and either a zero or a blank would go into that individual's file for that month or that period.

Then the next period when they exchanged the badge, the badge would now have two quarters worth of dose on it. What they would do is read out the badge, and all of that dose would be credited to that second exchange period. I never saw an example where they tried to prorate the dose and put it into the two exchange periods, obviously because you don't know for sure how that's done.

DR. ULSH: And if I could interrupt just briefly. If you think about what would happen in terms of how we would handle the dose reconstruction methods. It would actually, if they missed an exchange cycle and all of their dose that they accumulated over those two cycles were piled into one, we would then assign in addition to that, missed dose for that other exchange cycle. So it would actually be higher than if they had exchanged their badges.

MR. FITZGERALD: So you could (unintelligible) if it were a legitimate dose for that one period.

MR. LANGSTED: Exactly right.

MS. MUNN: That's such a problem. That's a real problem.

MR. LANGSTED: Now this was back in the days at Rocky Flats where people took their badges home every night. One thing when you connect the security badge with the dosimetry badge, they would check people to make sure they had their security badge as they left the plant site. They ended up having to take their dosimeter home with them. So there was not, when you went to exchange the badges, if a person was sick, if a person was working in a different building or something like that, it was tougher to do the exchange. So all of that added up to a lot of doses.

And we have looked at a number of cases specifically when

we were looking at this, and you'd see, I mean, for example, you'd see a worker that had a badge on a month, month, month, month, month, month basis. And then all of a sudden you'd see them with a quarter badge and a one-quarter badge and a couple of blanks, then a quarter badge then a blank, then a couple of quarter badges. That was looked like the case where the individual was a production worker originally on a monthly badge. Then they went to a management position where they, or a planner or something where they were not working the production areas, went on to a quarterly badge and then they just kind of fell from the routine of changing their badges from every exchange. So it created some holes. But we did have a continuous badging situation and we do have a continuous badge record if the data or when the data was recorded as it was.

Okay, zeros versus blanks. This depends on the period that you are looking at. When computer databases first came into being, a field would be designated as a numeric field and dang it, you had to have a number in that field. So if they had a non-exchange situation, a zero would get placed in that field for an individual. Later on it was recognized that there's a difference between a zero and a blank so let's put a blank in that field in place of a zero and the databases were updated to be able

to do that.
And that's where the genesis of the term no current data available came from. If a blank was available or a blank was in that field, we then go to run out a report for that individual, they recognize that rather than putting a zero there, they put a term like no current data available. So workers would see that and go, hey, what's the situation.
In fact, I had some situations where they'd come up and they'd say, wait a minute. And we'd go back and look in the records lo and behold, you didn't exchange your badge last period. Is that correct? Well, maybe. Let's see the badge you're wearing. Oh, it has last month's tag on it. So --
MR. DeMAIORI (by telephone): This is Tony DeMaiori with the steelworkers.
MR. GRIFFON: Yes, sir.
MR. DeMAIORI (by telephone): We had several criminal investigations at Rocky Flats over exceedingly high doses that were ended up reported no current data available. I'm making a statement of fact here. Sort of tell the Board that always a missed badge with no current data available and that's where it came from. I don't believe that's correct.
MR. LANGSTED: What was the time period this occurred?

MR. DeMAIORI (by telephone): Oh, this time period occurred from the early '80s we were getting no current data available. When I worked in Building 771, the time period during the Gable lawsuit when what they had wasn't considered an extremity.

MR. LANGSTED: I'm sorry, how does the had not considered an extremity --

MR. DeMAIORI (by telephone): Let's stick to the no current data available. There were several investigations at Rocky Flats as to why individuals' dose for the quarter or for the month exceeded their coworkers. And when I mean investigations, I mean criminal investigations that's for the internal dosimetry department to produce a no current data available. So to say that that was used strictly for a badge that wasn't turned in during a monthly or quarterly I believe is very inaccurate. I believe that those investigations will prove that to be true.

DR. MAKHIJANI: Could I ask a question about that? Is the paperwork from these investigations available?

MR. DeMAIORI (by telephone): Not to us.

DR. MAKHIJANI: Who would have it? If there were criminal investigations, presumably there's some paperwork to go with it.

MR. DeMAIORI (by telephone): Absolutely, and I'm sure

that you have a better ability to obtain than we do.

MS. MUNN: Who's the plaintiff?

MR. DeMAIORI (by telephone): There were several individuals who were investigated onsite for having too high of doses.

MS. MUNN: Who investigated them?

MR. DeMAIORI (by telephone): Internal security out at Rocky Flats, those would be Security records.

MS. MUNN: And the legal proceeding was brought as a result?

MR. DeMAIORI (by telephone): I don't know if a legal proceeding was brought, but the investigations were conducted.

DR. MAKHIJANI: Could you provide us with the names of the workers who were investigated? Because obviously a very important point of difference that's necessary to resolve.

MS. HOMOKI-TITUS: Don't provide those on the transcript, please.

DR. MAKHIJANI: Okay, yes.

MR. GRIFFON: We should follow up on this issue offline but and see when this investigation was and try to get some details out of this because it's, is that okay, Tony?

MR. DeMAIORI (by telephone): Yeah, that's okay.

MS. THOMPSON (by telephone): Another point of clarification, and you guys probably know this, and it might not be clear on the phone, but --

MS. MUNN: Who's speaking please?

MS. HOMOKI-TITUS: I'm sorry, you need to identify yourself before you start speaking.

MS. THOMPSON (by telephone): Jennifer Thompson. And you keep saying that the security badges and dosimetry badge were one. I'm assuming that you know that was only for a certain specified period of time because at least in the last 15 years that wasn't the case.

MR. LANGSTED: You're absolutely correct. In about 1991, the badges were separated and dosimetry for those that were not expected to exceed 100 millirem per year were discontinued.

MS. THOMPSON (by telephone): Right, and that's how you ran into those problems with the (unintelligible) workers in 371 and some of the other buildings where people actually got dose above the 100 millirem and did not have dosimeters including a pregnant person in Building 371, and there was an investigation into that because in the later years not everybody had a dosimeter.

MR. LANGSTED: That's correct.

MR. FITZGERALD: So from at least '64 then to '91 is the span where you had the integrated security

(unintelligible).

MR. LANGSTED: Well, let's see, I'm marching through my list of item, issue nine. One of the issues that was brought up during the review that's cited in number nine is the fact that in 1968, 1967 and 1968, several workers, several, 85, 86 and 87 people exceeded the five rem per year number.

And the question was how can you use that limit then as an indicator of what dose an individual might have received without tripping alarms and using it as an (unintelligible) estimator for a missed dose. And if you look at the, back in history, 1968 is when the Atomic Energy Commission implemented the five rem per year limit for occupational workers. Prior to that it was three rem per quarter or 12 rem per year.

And if you look at the Rocky Flats records, there were workers, there were many workers that were above five rem per year but less than 12 rem per year in the years just prior to 1968. And then in 1968 when the five rem per year limit was put in place, there were no workers that were over five rem per year. So the plant control systems were put in place then to monitor workers and keep those doses down to less than five rem per year.

So that break is very important to recognize when you look at that the table of workers or of doses for workers

at Rocky Flats. And in fact, the dose limits that the Task Five group uses when they're doing their estimations recognizes this limit dropping from 12 to five rem per year. And that table is in the technical basis document, the tool available for the dose reconstruction.

Exposures to low energy photons, neutron exposures to low energy photons, a technical basis document does recognize the fact that the film is relatively insensitive to neutrons below about 800 keV. And a bias correction factor is developed based on spectrum measurements that were taken at Rocky Flats and a worker or a claimant-favorable bias correction factor is identified and put into the dose reconstruction process to take credit for any dose that would be missed from neutrons with lower energies.

And this is quite claimant favorable because, in fact, the spectrum that were used to calibrate the dosimeters back in that time period were designed to be approximately the same or as close to as they could the neutron spectra that they were exposed to, the plutonium workers were exposed to. And taking credit for missed dose is actually probably not needed, but it is claimant favorable to do that.

MR. BUCHANAN (by telephone): This is Ron Buchanan. I had a question before you move on on that. When the

NDRP(unintelligible) was finished, are they going to use the table 618 in the TBD on page 34 of the original TBD, are they going to use that table on top of the NDRP data or will that eliminate that table 618?

MR. ROBINSON (by telephone): This is Al Robinson with the ORAU team. For what we've set it up and it's talked about in OTIB-0050 is that for non-compensable cases, well, the both compensable and non-compensable cases, we apply the 2.5 factor only to the portion of the dose that is original unchanged dose. The NDRP re-read dose and the notional dose do not get that 2.5 factor. So a portion of the dose does get the 2.5 factor.

MR. BUCHANAN (by telephone): Okay, thank you for that. Now a second question on the same line. It says it had some new neutron energy measurements. Now are they still talking about the P&L measurements or is this some new data from real time when the processes were taking place?

MR. LANGSTED: It is the P&L data.

DR. MAKHIJANI: I have a question about the low energy neutrons. I noticed in the (unintelligible) report that the moderated plutonium fluoride neutron had an average energy of .15 meV so that it almost the entire distribution of neutron energies would be below the NTA detectible. I don't understand how the dose for plutonium fluoride moderated neutrons is to be assigned

for that period.

DR. FALK: What you would have is, when you have the average energy for a neutron spectrum it's probably closer to a log normal distribution; whereas, you still have a significant portion of the energy carried by the higher energy neutrons that are not or maybe minimally moderated. So you still have a part of the neutron spectrum above the threshold that's going to give a three or four grain track. And then when you calibrate the film to film exposed to a moderate plutonium-fluoride source, which is what we did, then you have calibrated to a moderated spectrum and that tends to compensate for the neutrons less than the threshold which is needed to generate the photon ionization track of three and two-four(unintelligible) grains which is then readable.

DR. MAKHIJANI: I didn't see any distribution, I read, I didn't read (unintelligible) report. I kind of scanned it quickly but I did not see any distribution of neutron energies that would have provided for the moderated neutrons. Because (unintelligible) pretty low if you take 700 keV as the detection limit, you know, that's almost a factor of five above your average energy. The average energy would be above the median energy, so you're already, I don't know how long a tail you've got there.

DR. FALK: Well, what I will share with you is that when you expose neutron film to a moderated plutonium-fluoride source, you find tracks, and you find a fairly significant track density essentially even relative to the unmoderated sources.

DR. MAKHIJANI: I trust you, what you're saying. It just would be useful to have (unintelligible) so that it will register. Sorry, even though you're across from me. So that it would be useful to see the neutron energy spectrum for moderated neutrons.

DR. FALK: I'm not sure we have the spectrum, however.

MR. GRIFFON: But you have the calibration data. Maybe that would be --

DR. FALK: -- but we have the calibration data.

DR. MAKHIJANI: I don't get it. If you don't have the spectrum, how can you calibrate, how can you calculate --

DR. NETON: You just don't have the measured spectrum, I mean, you generate the spectrum of moderated neutrons, but you don't capture the exact distribution of the energies of the spectrum.

DR. MAKHIJANI: I guess I have to think about this in not real time.

DR. NETON: It's common practice. When you calibrate something, you don't necessarily generate the spectrum.

DR. FALK: But you do know what the dose rate is.

MR. BUCHANAN (by telephone): Yeah, this is Ron Buchanan. How do you know that dose? How was that dose rate determined?

DR. MAKHIJANI: I think we have to look at the information in more detail.

DR. FALK: The way we did it back in the '60s was that the plutonium-fluoride source was calibrated down at the Los Alamos graphite pile so that we knew the source for (unintelligible), the neutrons per second. And then we calibrated one of the neutron survey instruments which was the Hankins ten-inch (unintelligible) around the VF3(unintelligible) tube which is a pretty good dose rate meter for that type of the neutrons. And then we used that to basically calibrate (unintelligible) source (unintelligible), which is calculated out through the center of that VF3(unintelligible) tube. And then once you had that calibrated, then you put your moderator around the source and they were spherical shells that we put around the actual spherical source. And then use your calibrated survey meter, the Hankins sphere(unintelligible) to then measure the dose rate at the distance that you're going to calibrate the (unintelligible). That is the method.

MR. BUCHANAN (by telephone): Okay, thank you.

MR. GRIFFON: I just put that as an action, maybe you

can, if there's some document describing that method or --

DR. FALK: There is a paper captured for the Rocky Flats onsite data which is Mann(unintelligible) and Voss(unintelligible), I believe, 1964, a Rocky Flats document.

MR. LANGSTED: And that's referenced in the basis document.

MR. GRIFFON: We should follow up on that. Maybe you can --

DR. FALK: It shows the polyethylene shells that were used to moderate the source. Actually, there was a set of them going from about two and a half centimeters (unintelligible) the angle of radius out to seven centimeters. And then we made another one out to nine and a half centimeters. So we had a complete set there.

DR. MAKHIJANI: This is obviously something we have to look at.

MR. LANGSTED: Okay, a couple more items out of this issue nine. In 1993, the Defense Nuclear Facility Safety Board inspector was told about a potential problem with the algorithm where the low energy chip in the Panasonic dosimeter may not have had the correct factor applied to it. We're in the process of researching that now and see if we can find the managers that dealt with that.

This was during the time when the DOELAP accreditation process was coming into play. Sites were scrambling to get their systems so that they would respond correctly to the DOELAP standards that had been designed. We were sending Rocky Flats dosimeters up to PNL(unintelligible) to be exposed to these standard exposures and then reading them out. So during this process it's not surprising that the algorithm was under refinement to bring it in line with the DOELAP process at the time. We're researching that now and don't have the documentation on that at this point.

The final issue had to do with some House Committee on Energy and Commerce testimony that was given by the GAO. And the senior GAO manager that was testifying was talking about a clearly convoluted discussion talking about instrumentation at Rocky Flats, air sampling at Rocky Flats, and dosimetry at Rocky Flats. Reading through all of the testimony that was presented and the written testimony that was presented with it we can't make good sense out of what he was saying. It was clear that he was a senior manager that had been fed data by his other folks.

We're looking at that to see if we can make sense out of it. But the question that SC&A asked -- let me look at my notes here. Well, no, I'm sorry, I'm thinking about a

different thing, but it's not clear that the calibration of the dosimeters was the issue there or if it was calibration of the instruments. Again, this was about the time that standards were being promulgated by the national standards organizations that DOE was adopting and having to do with calibrating instruments to more rigorous standards than they had before. So this very well may have been the issue.

DR. MAKHIJANI: I actually raised this issue having read the testimony and my main question about that relates actually to the pre-'64 period. I don't know, the testimony itself doesn't relate to the pre-'64 period, but there are zeros and blanks in the pre-'64 period that we've observed in our review (unintelligible). And those are obviously of a different nature than the ones you described when people were wearing badges and didn't turn it in for one period and the badge was read in the next period where you could fill in the gap relatively easily. The question of the zero entry when a badge is not turned in or not worn and whether it relates to something like what we discovered at Nevada Test Site where people would take off their badges when they went into forward areas because they didn't want to be bumped from employment or overtime pay or not overtime, hazardous duty pay.

I don't know whether this kind of situation arose at

Rocky Flats or whether there's some other explanation for the zeros and blanks in the pre-'64 period. So my question didn't relate to the calibration side of the testimony, but to the zero side. I think there was a congressman who actually asked this question.

DR. ULSH: I think we might be mixing a couple of issues. The one that Jim is speaking about, the testimony by the GAO before the House Committee on Energy and Commerce, it was actually Mr. Schaffer(unintelligible), I believe, probably Bob Schaffer from the Fort Collins area, was asking about calibration of air monitors and the GAO person, Mr. Wells, was talking about how there were problems with calibrations in those instruments. And I think what Jim was saying is interchangeably he was using questions about the air sampling equipment and the dosimetry. So it's not clear that which was actually being referred to. The issue of blanks and zeros is a separate issue.

DR. MAKHIJANI: I don't have the (unintelligible) testimony in front of me and it's not in the part that Joe just handed to me, but this is from memory. But there is a portion in the testimony when Congressman Schaffer(unintelligible) and Mr. Wells are discussing the question of zero being entered when badges were not handed in. And so it's not clear to me that it's in the,

just in the post-'64 period or whether it applies to the pre-'64 period. There wasn't a time discussion there, but clearly since there are blanks and zeros, I think more in the pre-'64 period.

Here's the exchange. It's on page 107 of our review.

Mr. Shaffer: If a dosimeter was not returned should an estimate of the (unintelligible) radiation have been made? What's the result of not making that? Well, we think perhaps an estimate would have been included would certainly have been better than to report zero exposure. So that's the piece. So he was clearly saying that there was zero exposure reported when badges were not being turned in, and so I think clearly it's not a question that delimited, at least it's not obvious that it was delimited to the post-'64 period. So I don't know what we do about the --

MR. GRIFFON: And it may not be. I mean, I think the way you answered the question earlier was that if that, in fact, happened, then the person would have still have that badge, and it would have been carried through in the next analysis, correct? But that's on clear Arjun's saying.

DR. MAKHIJANI: It's not clear that's what happened in the pre-'64 period because in the pre-'64 period the badge and the security identification were not

integrated. And with the same problem, the reason it kind of raised an eyebrow on my part was I finished the NPS(unintelligible) interview. And when I talked to Mr. Brady who was involved with Health Physics there for decades, he had indicated that a lot of this problem of taking off the badges and so on was solved to a large extent in his opinion, was solved when the integrated badge was introduced. And so I wondered obviously whether the same problem arose at Rocky Flats when there wasn't an integrated badge.

MR. LANGSTED: Well, first of all the testimony there is 1994 testimony so it's very likely that they were talking about post-'64 activities.

DR. MAKHIJANI: Post-'90 actually. Possible.

MR. GRIFFON: But it doesn't negate his question.

MR. LANGSTED: Correct. No, the question if valid. And a pre-1964 zero could be from just the, you know, as I was explaining earlier, the non-exchange of the badge. Or it could be from a badge that, he's implying a badge that was lost.

DR. FALK: Can I jump in with two feet here?

MR. LANGSTED: You bet.

DR. FALK: As part of the neutron dose reconstruction project we actually reconstructed both the neutron and the gamma timelines essentially through 1989, about

through 1969. Nineteen seventy was not a well-behaved year, and we weren't able to successfully do that. Back in the pre-'70s, I did not see a practice where there were zeros without having a film there to be read. And they would read the density in the film areas for the gamma, and they would have a neutron film. The timelines that we reconstructed had blanks, and, in fact, blanks were then, if they were blanks for the timeline for the neutron monitoring in a plutonium-related area, we actually assigned neutron doses to those blanks. And there were a lot of blanks. And for the beta-gamma there was never --

MR. GRIFFON: I was just going to ask there. You said you assigned the neutron dose. How did you assign it, just based on (unintelligible).

DR. FALK: That's based on --

MR. GRIFFON: It's in your report, right?

DR. FALK: That is in chapter 11 in the neutron dose reconstruction project protocol of which you have a copy.

MR. GRIFFON: But it was based on minimum effectual limit or --

DR. FALK: It was based on gamma ratios. You have to have a gamma, also there's a combination method. If there were monitored neutron doses, they used average neutron dose per day or whatever and then they used a

combination method. It is stated in the protocol. And also looking at the beta-gamma worksheets, about the only time there was a zero was when there was a red film and they had (unintelligible) readings of basically zero. So that wasn't an issue back in the '50s and '60s.

DR. MAKHIJANI: So I guess you don't have the same problem of employment practices at Rocky Flats that they have at Nevada Test Site. I mean, when I came across this at Nevada Test Site, I went back and looked at the history. And they did have employment practices that sort of essentially encouraged people to minimize their dose by not wearing their badges, things like that.

DR. FALK: I'm not able to testify for all periods, but for periods that I know about that was not done.

MR. DeMAIORI (by telephone): I would like to speak on behalf of the United Steelworkers. This is Tony DeMaiori. Absolutely, we had the same incentives and de-incentives to us. We paid (unintelligible) pay. We paid area allowance. We paid respirator pay, and if you were burned out, you were moved to the south side of the plant or to the waste treatment operations, and you earned less money, no premium pay, overtime.

We saw it when we had to clean out the duct systems. Chemical operators would put screwdrivers through filters when the filters were plugged so that they could keep

operating their lines. This is something that I think's pretty universal in the nuclear industry as individual's doing things that weren't necessarily correct for different reasons.

And so that's not correct. I don't believe that's a correct statement at all. We saw it in the D&D operations. I can't tell you how many safety items we fixed that really weren't what the problem was. And the money has always been an issue, absolutely, the money's an issue. So that is not a correct statement.

MR. GRIFFON: Tony, to you're the best of your knowledge, do you know if people have told you or in the petition itself have alleged that they didn't wear their badge at certain periods or put down their badge when they were working on hot jobs, anything like that?

MR. DeMAIORI (by telephone): You know, I know during the lawsuit with Don Gable and his family, that's when he got brain cancer and died. I was a young chemical operator in 771 and there was a lot of talk over is his dosimetry correctly showing dose. Line one where people were being burnt out sent over to Waste Treatment. I saw an individual throw a badge into a salt can. Fifteen minutes later pulled it out. Everybody said, hey, let's see if it's going to show a higher increase and sure as heck it didn't, no current data available.

You know, when you work on the floor and processes, people do a lot of things that aren't procedurally correct for their own purposes. During the D&D operations a lot of short cuts were taken for financial gain by the individuals on the crews. I mean, you see a lot of this sort of things, and it's really hard, really, really hard to keep a handle on.

So what you saw in Nevada you'll see at any nuclear site in the country. That's absolutely the truth because of the incentives, because of the rewards. Myself as a chemical operator in 771, I picked up my paycheck every Thursday. With that I would sign my weekly dosimetery report; I would initial it.

And the weeks that I didn't have high dose my manager, George Stapleton, would tell me, hey, Ton, you're going to have to back in this office for your paycheck. And I'd tell him, what do you mean, George? He say, well, you didn't do nothing last week. Look at these low readings. So you know, this is not correct, absolutely not.

DR. ULSH: This is Brant Ulsh with NIOSH. We've actually heard similar statements at a number of different sites, not just at Rocky Flats, about, you know, I was getting close to my limit so I left my badge in my locker, things like that. We do have ways for handling situations like

that. Number one, if a claimant can identify when that happens that's one situation. But that's not very common. We're talking decades after the fact, in some cases even survivors.

But we also have technical methods. I don't want to get too far down in the weeds here, but the methods of (unintelligible) where we can look at Z plots of badge reads, and we can see an abnormal behavior of the dose over time. And we can go back and adjust those doses because that could reflect either exactly what the worker's alleging, that I left my badge in my locker. Or it can reflect they were getting close to the limit so they were pulled out of the area. In either case we can go back in and adjust those doses that are assigned in situations like that.

MR. DeMAIORI (by telephone): Well, and I understand what you're saying, but when we're talking about dose reconstruction, we're talking about a perfect world with all the facts. And so for us to say, I mean, I've got a lot of things I could say. You know, we didn't certify, what year did we certify our dosimetry lab?

DR. ULSH: Nineteen ninety-one.

MR. DeMAIORI (by telephone): Okay, so from '91 forward we knew we had a certified lab. And then I could talk about the practices at Rocky Flats when one of the female

workers would get pregnant. Where did we send them to work? Internal dosimetry lab.

MR. GRIFFON: Tony, just for the record, we need the spelling of your last name. I'm sorry.

MR. DeMAIORI (by telephone): D-E capital M-A-I-O-R-I.

MR. GRIFFON: Thank you.

MR. DeMAIORI (by telephone): But in the internal dosimetry lab, that's where we dumped all the pregnant workers. We gave them a two-week crash course on how to do their job, and it didn't matter if they came from janitorial staff. It didn't matter where they came from. Didn't matter what their skill level was. They ended up in the dosimetry lab. So you know, we can talk this until we're blue in the face. Hello?

MR. GRIFFON: Yeah, we're still here. I just want to get, I think we've touched on most of these issues now anyway. I know that we haven't resolved every one of them, but and the pre-'64 zeroing question, I think I'd like to see your report. I don't think we've all looked at it. And TIB-0050, I'm not sure. I think you have looked at that, but --

DR. MAKHIJANI: Ron's looked at it.

MR. GRIFFON: But the supporting full dose neutron dose reconstruction report, have you looked at that?

MR. FITZGERALD: (unintelligible) these issues were

matters of substantiation which just begins. We did see these anecdotal references. We did get this from interviews, and it wasn't the ability to take it to ground the (unintelligible) we got. So I think this is the beginning of the process of trying to make some sense of what we're seeing, to try and establish whether this is pervasive, systematic or whether, in fact, these were explainable aberrations based on the operational history of the plant.

So this is helpful. I think if we get more documentation of this sort -- and Tony, I guess I would say if there's documentation or substantiation to some of the issues you're raising as well, that would help us understand where there were investigations, where there were additional corroborating pieces of information. That would help take this from an anecdotal stage to one where there's actually some basis.

MR. GRIFFON: Let me also ask before I have to go, which is 15 minutes ago, if the, I'm trying to understand if there's a coworker model for Rocky, and if, this is sort of the same question that we went down with Y-12, how many of the current petitioners would require coworker data for their case to be reconstructed? That sort of question and for internal and external, I'm talking. And then the question becomes has that coworker model been,

you know, it's the validation question there.

DR. ULSH: It's a little different situation at Rocky Flats than at some other sites like maybe Y-12 where we relied to a great extent on CER data. At Rocky Flats we do have CER data, but we have access to original data as well. So you may not run into a lot of these validation issues that popped up for the CER data.

DR. NETON: It's a similar situation, I think, because if we do use the electronic Rocky Flats data, then you're in an analogous situation to Y-12 which is do we --

MR. LITTLE: We have some, for example, 1965 to 1970 we have PDFs of original data, handwritten data.

DR. NETON: Oh, no, I agree. I agree, but what we're saying is let's say that if we go and use the Rocky Flats electronic data to develop coworker models, then we still would need to go back and take these handwritten sheets and compare them against the electronic data to make sure that we have, you know, that the data agree.

MR. LANGSTED: We have an interim step there that Kaiser-Hill did for us. When Kaiser-Hill was requested by DOE to provide a claimant file for the NIOSH process, they would pull the paper Health Physics file for that individual. And Rocky Flats was good at putting the information in that paper file.

And then they compared that with their electronic

database that they had online at the time. And that included data that they had brought up from previous databases and one of the gentlemen that works on the NIOSH project actually worked at Rocky Flats and spent five or more years of his career maintaining that database or improving that database. And what Kaiser-Hill did was a QC check where they would put down the paper file, and then they would look at the electronic results.

And they would put those on a sheet together and score those and QC them. And if they found a problem, they would dig into it. You know, maybe a portion of the guys file didn't come over because he was actually a contractor for somebody else prior to that. And they would pull that together. And they provided that QC sheet along with the, usually the first couple pages in the external dosimetry file for that individual. So that gave us some pretty good information on the validity of that information.

MR. FITZGERALD: This is a searchable database by identifier. You could actually use that to corroborate then your actual --

MR. LANGSTED: Correct, correct.

DR. NETON: So it sounds like we're one step closer.

MR. GRIFFON: Might be a step closer, yes.

DR. NETON: I think to have that written up somehow in shape or form would probably be a good thing.

MR. GRIFFON: That'd be useful.

MS. THOMPSON (by telephone): But actually -- this is Jennifer Thompson -- he brings up a very interesting point in that when Rocky Flats was there, and you had access to the Kaiser-Hill folks, you could that. You can't get that anymore. Steve Baker was the person who used to do that, and he's obviously not there anymore. So for people that file after today, you're not going to necessarily have that level of accuracy coming from anywhere because the records have all been filed away now.

MR. LANGSTED: That's not exactly true because the records the records are still at the Denver federal center, and there is, DOE Legacy Management has taken over the records for Rocky Flats.

MS. THOMPSON (by telephone): Yup, I'm just saying that I don't think you're going to get the same service you got before because there's not going to be a dosimetry expert interpreting those records for you and doing any kind of QC on them.

MR. LANGSTED: Well, right now Legacy Management does have people in place to pull the records and assemble them for transfer over to Rocky Flats. Ken

Sabbatz(unintelligible), the guy who I was talking about who did work on this before is still under contract with Legacy Management to assemble that data. And so we are still seeing access to all of those records, and we're seeing personnel available to pull them together.

MR. GRIFFON: It's like Jim said, we might be one step closer here. I think, and of course, (unintelligible) we have in those kind of cases as QC was done on an individual level, but I doubt that any, well, I don't know whether that QC effort would have modified the database at all. So if you're going to use some coworker model from the database, you may have all this QC information never even gets considered when you're looking at the electronic CER database. So there's some information out there I think.

MR. SMITH (by telephone): This is Matt Smith on the line. For the record I'm the author on OTIB-0050, and I'm currently working on the external.

MR. GRIFFON: We can't hear you.

MR. SMITH (by telephone): How's this? Does that sound a little better?

MR. GRIFFON: Yes, much better.

MR. SMITH (by telephone): Just for the record I'm author on OTIB-0050, and then I'm also working --

MR. GRIFFON: Matt Smith? Is that --

MR. SMITH (by telephone): Matthew Smith, yes, with ORAU team. I'm also working on the external Rocky Flats data. Just to let everyone know with the coworker datasets that have already been processed through, it's been our standard procedure to go ahead and cross-check any (unintelligible) data against actual dosimetry records that we have on hand, and that procedure will be followed for this effort as well.

MR. GRIFFON: Thank you. I'm talking about coworker uses, but that's great.

DR. MAKHIJANI: A week or so ago, that's the 21st of February, we sent, Joe sent a memo to Jim and Brant and raising, a lot of the neutron dose issues have been addressed applicable to the (unintelligible) and rechecking, but there was a whole set of issues related to the gamma doses pre-1976. And so we are a step closer, but I wondered if they probably overlap with your preparation of the document you sent us a few days later. So maybe there'll be a supplemental response to some of those things to the extent they haven't been answered for.

DR. ULSH: We do intend to cover all the issues in the document that you sent over six days ago. You're right; it's not reflected currently completely. We've hit a couple of points in there. We haven't gone through

(unintelligible) point.

MR. LANGSTED: Was that the additional two issues?

DR. ULSH: Yes.

MR. LANGSTED: They're answered in the last pages of this thing you handed out today.

DR. MAKHIJANI: Did we get all the issues?

MR. LANGSTED: Yeah,(unintelligible) issue one and two, and there is the answer for each of them. That was an attempt to answer both the issues that you brought up in that memo.

DR. ULSH: We're have a change in --

MS. MUNN: I think we have all the action items that are necessary on the discussion here. The only other item that I have that was open for discussion was from our item four on the matrix regarding the americium calculations. We were going to do something about that.

DR. ULSH: Yes, for this issue we initially misunderstood the comment. We interpreted it as is it really valid to use americium as a surrogate for plutonium in lung counting. And after discussions with SC&A we realized that that wasn't really what they were asking at all. It had more to do with what about situations where we were dealing ultra-pure plutonium where the americium had been separated from it and how would we go about bounding the dose or calculating the dose in those situations. And

Roger Falk has provided a pretty good write up on this issue so I'm going to turn it over to Roger and let him explain.

MS. MUNN: So this wasn't in vivo assumptions about americium calculations?

DR. ULSH: I don't think. I hesitate to speak for SC&A, but I don't think you were questioning that measuring americium gammas is, that's an okay thing to do to count the plutonium. It was what about situations where you have an inhalation of fresh plutonium.

MR. FITZGERALD: Or recycled plutonium

DR. MAURO (by telephone): This is John Mauro. You're correct. A concern that we expressed the last time we met and discussed this matter and in our recent write ups had to do with there are, there might be classes of workers where the plutonium that's inhaled may have very little, if any, americium associated with it. And therefore, the chest counts won't reveal the presence of that plutonium.

DR. ULSH: Now that we have a handle on what you're really asking, I'll let Roger maybe go into some of the details.

DR. MAKHIJANI: Just to more fully explain the concern, there are two levels in this concern. The one level is how fresh is the plutonium. The other level is the same

plutonium run through Rocky Flats a number of times. So each time you remove the americium, you're essentially removing what used to be Plutonium-241 so when you send it back out, the amount of Plutonium-241 is less than in freshly made, weapons-grade plutonium where you have a certain ratio.

You have six percent Plutonium-240 and send them out Plutonium-241, but you don't, if you send it back after 15 years, purify it and take out the americium, you don't have the same amount of Plutonium-241. It's reduced by a factor of two. So the second time around you don't have the same starting point for Plutonium-241. So there are the two levels of concern regarding pure plutonium and how much americium is generated, what the algorithm for it is.

DR. FALK: This is something that we were actually aware of in the real time, and so we put into place, I think around 1972, a process -- well now, actually we started in 1969 to measure or to have radiation monitors give a representative sample of the exposure material for all known possible inhalation accidents. And then that was sent to a counting lab to then calculate the parts per million of the americium in that sample by using the ratio of the 60 keV to the L X-rays(unintelligible). And also starting in 1972 if we got situation in the part of

the operation that we knew was essentially pure plutonium and we know where that was starting at line 15 where on the ion(unintelligible) exchange columns in Building 71 they had separated out the pure plutonium and then later on separated out the americium, and then that went to line one. And we heard people say that line one was a very high gamma field. Yes, it was. That's where the purified americium went. And then line 15 was actually where they had the actual precipitation of the purified plutonium. It went through the (unintelligible) lines 17 and then went through the (unintelligible) line 17 and then went to --

MS. MUNN: Hello? This is a conference call. You were spliced into our conference.

UNIDENTIFIED CALLER (by telephone): I'm sorry.

MS. HOMOKI-TITUS: Lew, are you all still there?

DR. WADE (by telephone): I can still hear you.

DR. FALK: -- and so if we had a possible exposure in the operations where first of all we knew it was likely purified (unintelligible) americium, we did not rely only on the lung count, but we also did urine sampling, and we also did fecal sampling. Also, for situations that had the initial parts per million less than 200, which is fairly low, we put that worker on a quarterly recount for his lung count for the next four quarters, exactly one

year afterwards.
Whereas, at that point there would be americium have built in that was starting to have sensitivity. So, yes, there are circumstances where there were purified plutonium. And then that button was then put in the vaults and probably wasn't used for maybe three or four months. So then you'd had some more americium built in and we built in at a rate of about 20 parts per million per month. So you had the (unintelligible).
Now the second part about the Plutonium-241 content. One of the things that Rocky Flats did was to meet weapons-grade specifications they blended old and new plutonium. The new plutonium came from Hanford and also the Savannah River but wasn't used as such. It as blended with the (unintelligible) plutonium to maintain the certain spec.
Now also our technical basis document, we noted that although the spec for the Plutonium-241 seemed to be a fairly constant at around .5 percent of body(unintelligible) weight, in 1976 based on the environmental impact statement studies, they were down to .36; and therefore, we have specified in the technical basis document that from 1976 forward you should use the lower number.
Now once we get to the end of the production in 1989, then of course, see Rocky Flats Technical Basis Document

which was the site basically aged that from that point forward. So those issues have been covered.

MS. MUNN: Happy with that? Those are the only issues that we had on the table today. Are we all on the same page?

DR. ULSH: Were there any other SEC issues that we're missing?

MR. FITZGERALD: No, those were the four plus one at this point in time. I think the key ones were clearly the high-fired issues for the internal side, the data integrity issues which I think we clearly need some more of the documentation that was referred to, but I think this takes us further along. I think we're pretty satisfied with the further explanation of the americium and then we didn't really spend time with the NDRP, but I think there again, looking at '50 and looking at how that's going to be implemented will go a long ways to telling us how that neutron-photon(unintelligible) as well the NDRP works.

I think that where it leaves us on Rocky is we've got a fair amount of homework to do on the high-fired. I think we've already referred to the fact we're going to look at the OTIB and then have a, I think it's a real good idea to have a technical conference call and just really have time to hash this out. Clearly, (unintelligible)

internal dosimeters around stand back and see what happens. Hopefully, we'll be on the same page by the time --

DR. NETON: It might be better to even get a face-to-face meeting of the dosimetry folks because as you can see talking about graphs and figures and tables over telephones --

MR. FITZGERALD: Just to put this one to bed I think it's almost worth it.

DR. MAURO (by telephone): Jim, this is John. During the break I was sort of thinking about trying to, what's the single question I would like answered that would sort of answer the question for me is on this whole internal dosimetry is are there any circumstances where the assumption that it's type-S would not give you the highest dose to the system organs? That is, in effect what you were saying, and I know I'm re-opening a little bit, but I'm trying to simplify it because it got awful complicated.

In effect what you're saying is if you assume, if a person's exposed to high-fired plutonium but you assume it's type-S, under all circumstances you're going to come up with a higher dose to his systemic organs than if you assume it was super-S. Is that, I mean, when it all boils down, that's my understanding of what your position

is.

DR. NETON: Actually, I think I would say that if it were M, you'd end up with a higher dose.

DR. BEHLING (by telephone): Does that apply to starting with a urine sample though?

DR. MAURO (by telephone): Yes, I'm sorry, Hans. I didn't make myself clear. Starting with a urine sample, whatever the mda is. You can pick any mda you want. I know that's an issue. Starting with that and then you're saying whatever the organ is I want to count, you know, starting with the mda, I want to come up with a dose to some systemic organ, the kidneys, bone.

If you assume it's type-S, you get the highest dose as opposed to assuming it's super-S. That's what I understand your position is. And it sounds to me it's very easy to determine that by running a number of IMBA runs where you vary the kinetics of the super-S to see if there's any circumstances where the half-time of the clearance, changing that, whether or not that would give, you could find the situation where, no, super-S will give you a higher dose.

If you can't find one of those, that is, you're searching for it but you can't, I think you've put the question to bed.

DR. NETON: Well, I don't think you need to do that

though because all I'm really saying is we need to bleed the amount of plutonium out of the lung into the blood to get the urine sample to be at the detection limit. Let's say there's never a positive uranium. All I'm saying is every single sample has been at the mda. It really doesn't matter whether it's S, super-S. All I'm saying is it's right at the detection limit for the entire history of the worker's exposure.

DR. MAURO (by telephone): Yeah, and I'm okay with that, but see, one of the things I realize is that as you make the clearance -- let's say you're talking super-S. As you make it lower and lower and lower, what that means in order to get a detectable level or just at the mda, the amount that has to be inhaled starts to go up. So therefore, it might be a non-linear thing, that is --

DR. NETON: No, no, John, what I think happens, and that's what I was trying to get at with Joyce, is it's very true up until the point of the last bioassay sample that the urine is being fed by, it doesn't matter how much is in the lung, it's just saturating the system and you're getting at the mda levels. What happens is after the last sample and the guy retired, then you start still having that compartment feeding.

And it's true what Joyce said that the value could go up after the last sample. That's where we're going to rely

on this autopsy data to show that that indeed has not happened. We need to have another meeting I think.

DR. MAURO (by telephone): Yeah, that's for sure.

DR. BEHLING (by telephone): Jim, I'm not so sure I agree with that because I've run IMBA for several cases that I've audited and substituted M for S and found that that S actually gives you a higher dose to a specific organ than type M.

DR. LIPSZTEIN (by telephone): That's right.

MS. MUNN: Let's have another meeting and talk about it.

DR. NETON: But are you doing acute or chronic intakes, Hans?

DR. BEHLING (by telephone): Well, I used whatever they assumed in their particular model which sometimes involved both. There were periods of chronic and then there was discrete acute intakes et cetera, and I just basically kept as they had assumed without knowing, and they didn't know whether it was type M or S either. I just made the assumptions that they used but substituted S for M and I came up with a higher dose.

DR. NETON: Well, I think we're comparing apples to oranges here. We need to sit down. I think we're probably going to end up in the same place but --

MR. FITZGERALD: I think that's where we are, yeah.

DR. NETON: -- we need to meet.

MS. MUNN: It's pretty clear we have to have another meeting. I hesitate to even talk about calendars without Mark here, and he will be back tomorrow.

MR. FITZGERALD: Well, I think it's going to be conditional, OTIB-0049.

MS. MUNN: Primarily it's the technical people who need to agree on a date.

DR. NETON: I think what we'll do with that if it's okay with the subcommittee is that we will agree to meet among ourselves, and we'll make sure that everyone on the subcommittee is aware of those dates and times and certainly available to sit in and listen, but we'll be under the pretense of a technical discussion among ourselves with minutes to follow.

MR. PRESLEY (by telephone): This is Bob Presley. I think that's a good idea, Jim.

DR. NETON: And that way we can work with our own schedules and try to accommodate the subcommittee but --

MS. MUNN: Good, I'm sure that one or two of us can probably make it.

DR. WADE (by telephone): Just for the record, it's a working group not a subcommittee.

DR. NETON: I'm sorry, working group, yeah. I think I would like to do this before the conference call on the 14th of the month.

MR. FITZGERALD: I think what you're saying is a TBD in about a week or two. I think that'd be --

DR. NETON: Yeah, in a week or so or ten days maybe we can have, we'll get you the documents that you need and then maybe in the middle of the week before the conference call.

DR. MAKHIJANI: So you'll get us the dose reconstruction that you've done and the TIB-0049 in a week or so?

DR. NETON: We will try. Let's, I'll go back and confer with our technical folks and make sure we can meet these schedules.

DR. MAURO (by telephone): Jim, even if it's only TIB-0049, that'll get us going, and if we could schedule something shortly thereafter, if you could also find an example, that's even better. But TIB-0049 would certainly be the trigger.

DR. MAKHIJANI: Jim, it would help if TIB-0049 is essentially at the stage of signature, release that in a day or two and then give us these numbers. A little bit down the line maybe we could have a meeting on the 13th or something.

DR. NETON: And I think I might be able to come up with some examples to illustrate what we've been talking about here in a better form. And maybe when Hans and Joyce and I and others can sit down, we'll just have a chat. I

mean, and I think maybe face-to-face isn't the way to go. I don't know. I don't want to make people travel more than necessary, but this is an important issue.

DR. MAKHIJANI: This is a very important issue. It has huge implications not only for --

DR. BEHLING (by telephone): Arjun, can I ask a question? This is Hans. And it seems like you may have addressed this issue earlier, but you and I had talked about the issue of the pre-1976 merging of deep dose(unintelligible) between photons and neutrons and the complexity that it might create especially also with item number nine that you discussed regarding missed doses or zero doses. Has that been resolved, Arjun?

MR. FITZGERALD: That's the new issue.

MS. MUNN: That's the new issue apparently as Joe says so maybe you need to talk offline to Arjun and Joe about that Hans because we're really rapidly winding down here.

DR. MAKHIJANI: Brant, you had a quick response to that.

DR. ULSH: Are you talking about separating gamma from neutron before --

DR. BEHLING (by telephone): Yeah, and it ties into the issue in comment number nine about zero or blank doses. It basically focuses on the pre-1976 data was blended between neutrons and photons into quarterly doses. In other words they were collated if you were monitored

monthly or even bimonthly, then you only get a quarterly dose, and of course, you would never know how many missed doses there were or below mda values et cetera. And it ties into comment number nine.

MR. SMITH (by telephone): This is Matthew Smith. I know everybody wants to go, but I'll direct you Hans toward OTIB-0050, and we have an approach for the situation written up in OTIB-0050.

DR. BEHLING (by telephone): And that was my final comment was in addition to TIB-0049, I guess TIB-0050 would also provide us with some insight and perhaps answer some of those questions.

MS. MUNN: Fifty is out there.

MR. FITZGERALD: Yeah, it does. It does.

MS. MUNN: Unless there's something that we just absolutely cannot wait --

MR. LANGSTED: One item and just reiterate, we just covered it, this notion, since it's important from the standpoint of the coworker validation, I think Mark touched it just as he was going out the door, which is if we can get anything to substantiate this CH2N Hill(unintelligible) database and how that can basically characterize the distribution, the validation of distribution, that would be helpful. But I think it's the only handle.

It does get us a step closer, but it's not clear how that would be used at this point between the CER database and the raw data. I think this is an interesting tool. We don't it at Y-12, but certainly here we actually do. And I guess the question is can that really help answer that question or not. I guess we've heard some questions about whether we can get to it. I think you indicated you can.

MR. FITZGERALD: I'm sorry, I missed your point about the CER database.

MR. LANGSTED: No, I'm just saying that the discussion we had at the CH2N Hill(unintelligible) database which can be used to link or certainly demonstrate validity of the electronic database with the raw data. CH2N Hill(unintelligible) apparently compiled this, used it. They applied it on an individual basis. Is it still available maybe on a database-wide-type characterization not just individually? Can it be used?

MR. FITZGERALD: Yes, it's available, and it's up and running and we've got --

MR. LANGSTED: If you can provide something, you know, this is the first time we've heard it. Can you provide anything that would give us some background or understanding of that I think that would be helpful to the Board, work group and (unintelligible) as well

because it certainly answers the question that's been there which is whether you can actually do the same thing we're trying to do at Y-12 which is validate the electronic version of this which will be used.

MS. MUNN: I'm not going to ask if there's anything else for the good of the order. The good of the order is done.

DR. BEHLING (by telephone): Wanda, Wanda, Wanda, don't say that to me because I need to ask you one final question here. And that is tomorrow morning are we going to start on doing the audits of individual dose reconstructions starting first thing in the morning?

MS. MUNN: It was my understanding that we were going to do procedures first, but I could be incorrect about that.

DR. BEHLING (by telephone): Okay, well, I listen to that anyway. What time do we intend to start?

MS. MUNN: Nine a.m. Same time, same number, same station.

DR. NETON: Well, we're certainly not going to start with Y-12 or Rocky Flats tomorrow that's a done issue. Stu will be here tomorrow and I don't know whether they're starting with procedures or dose reconstructions, wherever you guys left off in Cincinnati.

DR. BEHLING (by telephone): I won't be there, Jim, so I'm going to be talking to you over the phone.

DR. MAKHIJANI: Wait a minute, Hans, you're not going to be here?

DR. BEHLING (by telephone): No.

DR. MAKHIJANI: Kathy's not going to be here?

DR. BEHLING (by telephone): No.

DR. MAKHIJANI: Who's going to represent SC&A here because I'm not here.

DR. BEHLING (by telephone): I'm going to be on the phone talking to you.

DR. MAKHIJANI: Okay, fine.

MS. MUNN: All right that's fine. We'll talk to you tomorrow at nine o'clock.

MR. HILLER (by telephone): Before we split this is David Hiller, Senator Salazar's office

MS. MUNN: Yes.

MR. HILLER (by telephone): Lew, are you still on the line?

DR. WADE (by telephone): Yes, I am.

MR. HILLER (by telephone): Lew, can we get just a couple of minutes? Can you stay on the line so we can sort of get a little de-briefing for those of us who are not technical experts?

DR. WADE (by telephone): Sure.

MR. HILLER (by telephone): Thank you.

MS. MUNN: We're on our way.

DR. NETON: I don't know whether the NIOSH folks (unintelligible) stay on the line or do you just want to speak to Lew? Is that --

MR. HILLER (by telephone): Actually, my own personal interest is just to make sure that I understand what was accomplished today and what the next steps are that are going to lead us toward the April meeting.

MR. PRESLEY (by telephone): This is Bob Presley. I make a recommendation. Hello?

MS. MUNN: Yes?

MR. PRESLEY (by telephone): Can Lew call him back so we don't have a bunch of people on listening?

DR. WADE (by telephone): Okay, if you give me your number, I'll call you.

MR. HILLER (by telephone): Okay, ready?

DR. NETON: We're going to sign off here from Boston.

MS. MUNN: Lew, hold on.

MS. HOMOKI-TITUS: Lew, this is Liz. When you get done with --

MR. DeMAIORI (by telephone): Hey David, this is Tony.

MS. ALBERG(unintelligible) (by telephone): This is Jeannette, too.

MR. DeMAIORI (by telephone): We'd all like to hear this.

DR. WADE (by telephone): Okay, why don't we stay on the line.

Liz, what were you going to say?

MS. HOMOKI-TITUS: Just when you get done de-briefing them, if you could give me a call on a totally different issue and let me give you my cell phone number.

DR. WADE (by telephone): Okay.

MS. HOMOKI-TITUS: If other people promise not to call me too much on it, [information redacted].

DR. WADE (by telephone): I'll call you when I'm done.

MS. MUNN: We'll speak with most of you tomorrow morning I assume at about nine o'clock. Thank you and goodbye.

(Whereupon, the Working Group concluded at 4:50 p.m.)

CERTIFICATE OF COURT REPORTER

STATE OF GEORGIA

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I, Steven Ray Green, Certified Merit Court Reporter, do hereby certify that I reported the above and foregoing on the day of February 27, 2006; and it is a true and accurate transcript of the testimony captioned herein.

I further certify that I am neither kin nor counsel to any of the parties herein, nor have any interest in the cause named herein.

WITNESS my hand and official seal this the 4th day of April, 2006.

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STEVEN RAY GREEN, CCR

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